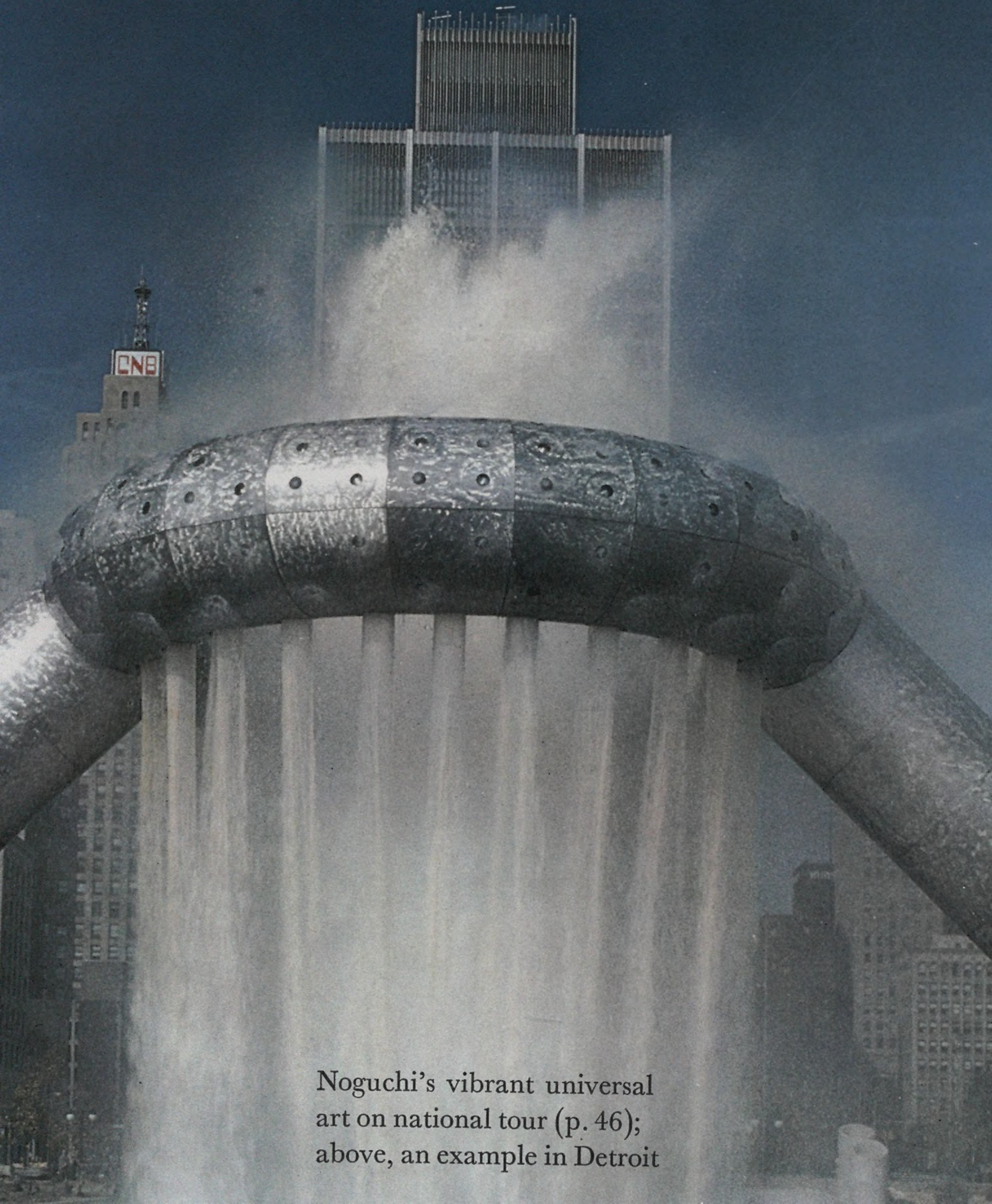
April 1978

Smithsonian



Noguchi's vibrant universal art on national tour (p. 46); above, an example in Detroit

"The Lincoln Versailles gives me the smooth ride I want. It was a major factor in my switching."
Carrie Straach, former Cadillac owner

"The Continental Mark V has the highest resale value of any car in its class."**
Gilbert Lawrence, former Cadillac owner

Many Cadillac owners have switched to Lincoln Continental, Continental Mark V and Lincoln Versailles.

How do they like their new cars?

"The Lincoln is roomier than Cadillac deVille, yet the mileage rating is virtually the same."*
Edward McHenry, former Cadillac owner

*EPA estimates for the Lincoln Continental with 6.6 litre eng. 20 m.p.g. hwy., 13 m.p.g. city. For Cadillac deVille with 7.0 litre eng. 19 m.p.g. hwy., 13 m.p.g. city. Your actual mileage may vary depending how and where you drive, car's condition and optional equipment. Cal. ratings lower.
**Based on recent national average NADA used car trade-in figures.

LINCOLN-MERCURY DIVISION

Ford
75TH ANNIVERSARY

On Photographing the Invisible

To the naked eye, it was a Swedish 80-ore postage stamp. A rarity, and very valuable.

The camera, however, told quite another story. The stamp was a counterfeit.

Faint traces of tampering that were hidden to the naked eye were revealed by the camera. Someone, somewhere, had ingeniously altered the stamp by chemically removing a surprint. The stamp was worthless.

To the naked eye (left), the stamp was genuine. To the camera (right), it was a counterfeit. Note the faint, dark traces of tampering now revealed in the upper section.

What manner of exotic camera was this that could "see" the invisible?

The lens: one of the 20 in the Hasselblad arsenal, the 105mm Zeiss UV-Sonnar f4.3. Designed for photography within the ultraviolet portion of the electromagnetic spectrum, its costly quartz elements can detect radiations that are unseeable by the human eye.

It has peered at objects in outer space, examined forgeries, laid bare the secrets of counterfeit money. Not a lens for everyone, obviously, but an indication of just how awesomely comprehensive the Hasselblad System is.

The camera: an otherwise perfectly standard Hasselblad 500C/M, normally fitted with an 80mm Zeiss Planar f2.8 multi-coated lens.

This is the basic model that allows you to tap into the vast Hasselblad System. It is one of the most bewilderingly versatile cameras the world has ever known. Yet so marvelously simple to operate that it often plays the part of the family snapshot camera.

A True System.

The Hasselblad System is a prodigious array of 4 cameras, 20 lenses, 8 viewfinders, 9 film magazines, and over 300 other accessories. Choose the right pieces, and your 500C/M would be equipped for sports, aerial, architectural, and fashion photography.

And portrait, landscape, medical, underwater, and news photography.

And wildlife, laboratory, industrial, and child photography.

And you would always have the right film in the camera at the right time. You can shift from color to black-and-white and back again to color—and resume shooting at precisely the right frame—by popping in the protective dark slide and switching film backs.

The Camera with Nine Backs.

There is a small button on the film back of every Hasselblad 500C/M. Slide it sideways with your thumb and the back will come away in your hand.

The standard back holds 12 exposures. Each frame of film is 2¼ inches square, *almost four times the area of a 35mm frame.* (See box, below right, for actual size.)

This is only the beginning. There are eight other backs available: Backs that let you change to a 6 x 4.5cm format...or a 4.5 x 4.5cm superslide format for showing in any 35mm projector. Backs that give you a choice of 1, 12, 16, 24, 70, or 500 exposures. A back that is a sheet-film adapter. Even two backs for Polaroid film, so you can check composition, lighting, and exposure ahead of time.

You begin to realize why eight out of ten top commercial photographers surveyed name Hasselblad as the medium-format camera used in their work.

Retained Value vs. Obsolescence.

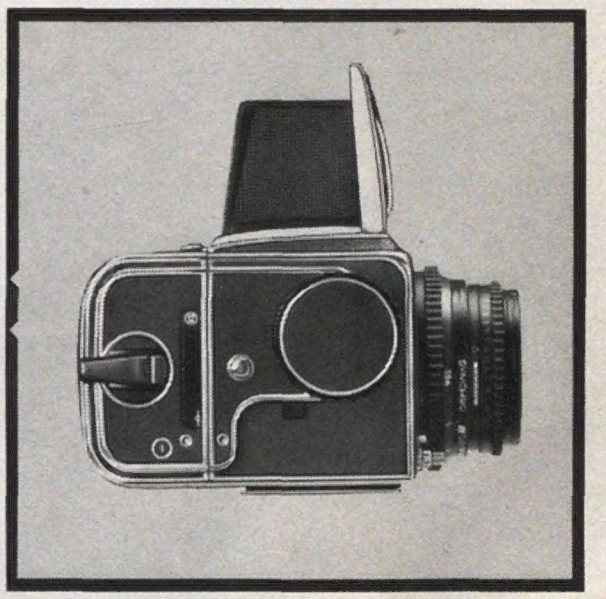
In an age when machines spew out cameras in the tens and hundreds of thousands, when flashy new models thrust last year's marvels into early obsolescence, Hasselblad goes its own way.

Planned obsolescence is taboo at Hasselblad. All but two of the accessories for the 500C/M will fit every Hasselblad made since 1957 (except the Super Wide C)...and will fit every future Hasselblad.

The greater part of a year is spent on building each camera, much of it crafted by hand. And fully one quarter of the work force devotes its time to nothing but quality control.

Little wonder, then, that a preowned Hasselblad commands such a high price...if its owner can be persuaded to part with it at all.

HASSELBLAD



The Hasselblad 500C/M.

A lavish brochure is available free if you write: Braun North America, Dept. S478, 55 Cambridge Parkway, Cambridge, Mass. 02142. Braun North America is a division of The Gillette Company and exclusive marketer of Hasselblad cameras in the U.S.

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April 1978

Smithsonian

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Children have always dreamed of running away to join the circus. And so it is with FunnyFace, captured in ruffles and greasepaint by the artists of Cybis.

FunnyFace dreams in porcelain, 10-1/2 inches tall. And he's just one of the inhabitants of the enchanted world of Cybis.

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The only thing this radio doesn't do is transmit. But Sony's new FM/AM, short wave (including Citizen's Band) radio will take you more places than you'll take it. Out of the neighborhood. Even out of the country.

For all you hams out there, it's got the three major short wave bands. You'll be able to pick up broadcasts from all over the world, 24 hours a day. And when there's a specific short wave broadcast coming up that you don't want to miss, you can pre-tune precisely to the frequency. (With conventional tuning systems, you'd have to fiddle around waiting to hear the station identification.) This is because of a dual conversion system with Sony's unique crystal marker and band spread dial. (Up until now it only went in our professional sets.)

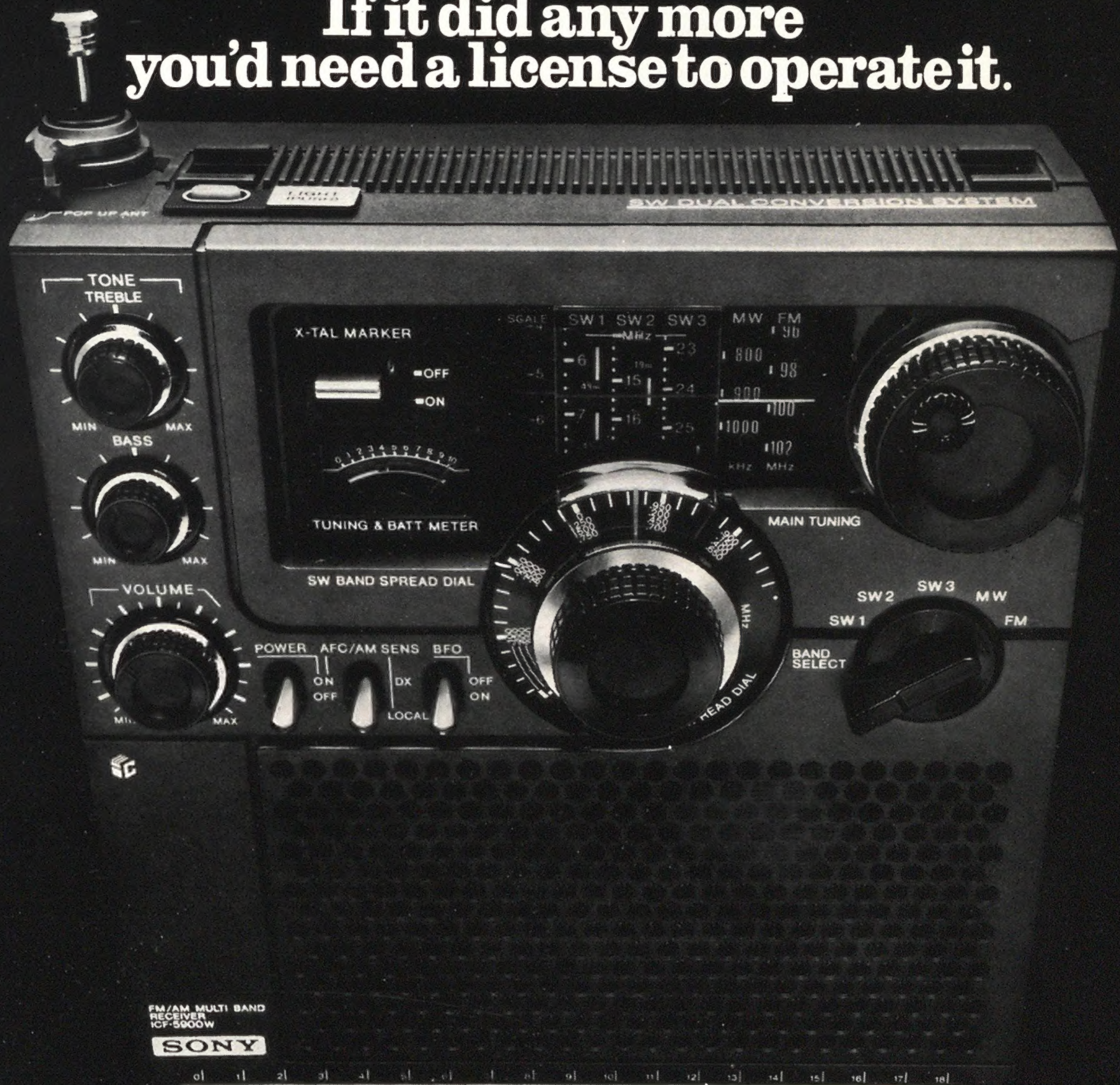
If listening in on other people's conversations is appealing, it's got all 40 CB channels. But good conversations aren't the only things you'll get. You'll hear the latest weather reports, accident reports, and traffic conditions.

For those times when talk isn't what you want to hear, tune in to FM or AM and tune out the rest of the world.

OK, so that's what you're going to hear. Now for how all this is going to sound—Great!!! It's got a 4" speaker for our famous Sony sound. And for the best sound of all—here's the price: only $150.*

So if you think you're a good listener, Sony's new radio is your chance to prove it.

If it did any more you'd need a license to operate it.



"IT'S A SONY."©

Secretary Ripley's comments

The view from the castle

On our eighth anniversary, this magazine reflects vast changes. And if they include a return to human values, so much the better

How far, in human scale, events have swept us onward since the first issue of SMITHSONIAN appeared eight years ago this month! Young people everywhere have come successfully through waves of disenchantment into calmer waters. Older ones have been shaken as never before by the buffeting of ordinary living. We have watched, awed, as a new realization of the fragility of life on this planet has come home to us. We have survived wars, hurricanes and tornadoes, desperate winters, the continuing crisis of our energy sources, fears of world food shortages and the ever-increasing multitudes of mouths to fill.

Meanwhile, the world of the arts, of new horizons in science, flourishes apace. Our magazine has attempted to delineate all this. We have thought of its subject areas as interlocking: the things the Smithsonian Institution is interested in (science, cultural creativity, environmental problems, the lessons of history, the accomplishments of museums); the things it might be interested in; and the things, perhaps, it *ought* to be interested in. Where should we be going and what are the priorities for mankind? Perhaps the answers elude us, but the questions are worth asking, as part of our mandate for the "increase & diffusion of knowledge."

In the United States our thoughts today are preoccupied with inflation and the cost of everything, with cynicism about public morality, with the loosening of the traditional authority of religion. Every day we read about new poisons in the atmosphere, in the water, in food additives, even in our own blood. The threat of nuclear war seems to have paled beside the perennial presence of carcinogens.

This does not seem to be an age of giants anymore and, for Americans at least, it is an age of disillusion; the glow is off the peach. Even travel—the recourse of so many restless Americans—seems less fun, especially with the shrinking dollar. The world has ceased to be our oyster.

Well, so what? To me this shrinkage has been healthy, even if to cherish diminished expectations sounds un-American. I find myself responding with a kindred feeling to President Carter's appeal for values. In his modest words there is a sense of morality and a return to a less grandiose, more human scale.

The past eight years have seen some towering accomplishments: the space shuttle, as well as other new breakthroughs in science—from an understanding of galactic events to recombinant genetic engineering in cell biology. A good deal of this we have shown you in our pages (see, for example, the issues of May and June 1977). We are pleased that you have responded with interest. You are our family and we count on that. On this anniversary we think of you, our Associates, and are deeply grateful for your support.

Is the new American tone of lowered expectations and lessened arrogance having a ripple effect? This, and the state of the world economy, may just possibly be bringing us all back to reality, to a restoration of human values. That could be a real blessing. As Thomas Jefferson said, in a similar vein to the remark quoted on page 45, "The care of human life and happiness, and not their destruction, is the first and only legitimate object of good government."

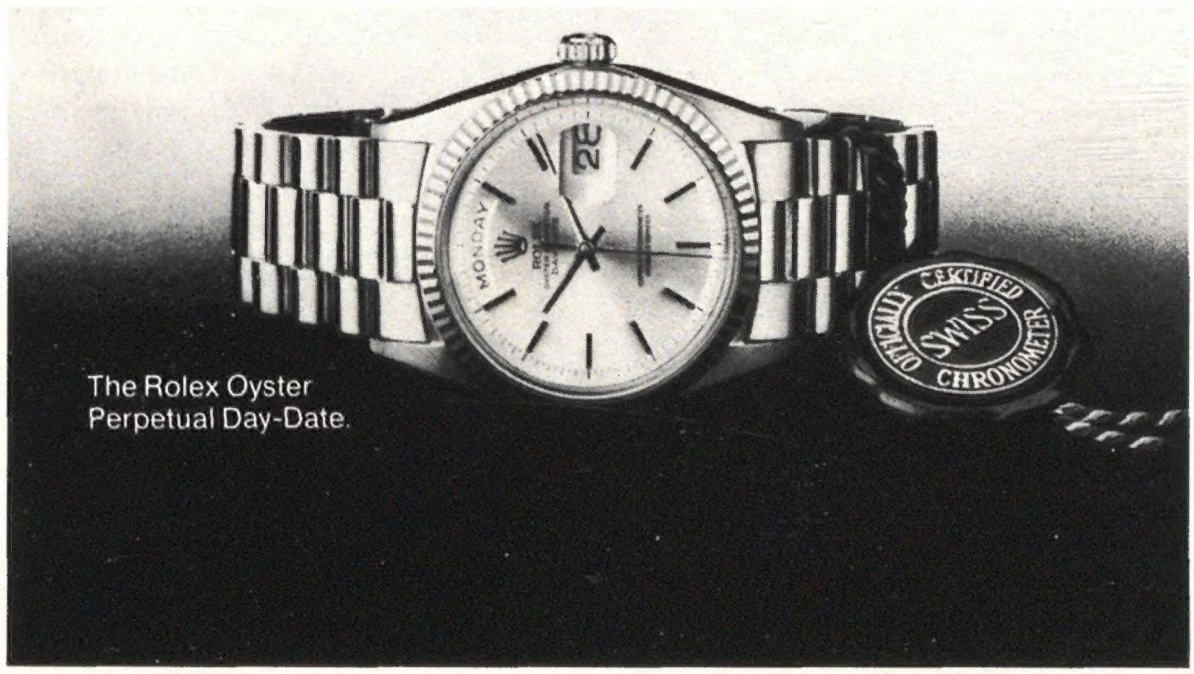
S. Dillon Ripley

Announcing The Winners of The Rolex Awards for Enterprise

OF THE ROLEX OYSTER 1926 - 1976 TO MARK THE FIFTIETH ANNIVERSARY
The Rolex Award for Enterprise
Created by Montres Rolex S.A. to sponsor outstanding personal enterprise

In September 1976, to celebrate the 50th anniversary of the Rolex Oyster, we launched the Rolex Awards for Enterprise.

"To provide financial help for projects which seek to break new ground in their particular sphere and which capture the spirit of enterprise shown by Rolex, and Rolex owners, over the last 50 years."



The Rolex Oyster
Perpetual Day-Date.

We offered a total of five awards of 50,000 Swiss francs each, together with a specially inscribed Rolex Chronometer.

The response from around the world was overwhelming and over 3,000 projects were finally considered.

The Winners

This spring, Dr. Billy Lee Lasley, Kenneth Lee Marten, and Francine Grace Penelope Patterson from the U.S.A., Luc Jean-François Debecker of Belgium, and Georges Marcel André Delamare of France were invited to Geneva, where they were each presented with a check for 50,000 Swiss francs, together with a specially inscribed gold Rolex Chronometer.

The Book

"The Rolex Awards for Enterprise," by Gregory B. Stone, will be published later in the year as a lasting tribute to the Rolex Spirit of Enterprise. The book will give a full account of the winning projects along with the details of hundreds of other entries. In the meantime, if you'd like more information on the winning entries, write to Enterprise, Rolex Watch U.S.A., Inc., Rolex Building, 665 Fifth Avenue, New York, New York 10022.

ROLEX

Letters to the Editor

Polar bears

Dear Sir: A winter icicle to you who must have been psychic when you chose the polar bear cover and the contents for the February SMITHSONIAN. Mother Nature's snit with Man gave us plenty of time to read it from cover to cover as the snowplows rumbled day and night and TV stations kept us busy listening to worse plights in other parts of the country.
Ceil Smith Thayer
Caldwell, New Jersey

Red Cross Tracing Service

Dear Sir: I have been touched by John Dornberg's article, "The long search for the millions uprooted by war," not only because I am a mother and a teacher, but also because I myself was one of those uprooted children.

And yet, in my innermost being is this burning question: what about the 200,000 Polish children, and their families, taken away from occupied Poland between 1939-45 for Germanization? Only a fraction of those children were returned home. I wonder how many Germans, with forged birth certificates, blond hair and blue eyes, know that in their veins runs a thousand-year-old Polish blood, or how many of them would be startled and uprooted again, were they to find it out?
E. Kristine Belfoure Vetulani
Woodlawn, Maryland

Dear Sir: Somehow (and I don't know why) I never have really thought about the tragedy the German people themselves must have suffered during and after World War II. It is truly a miracle that the Red Cross service is able to find so many persons displaced by the war.
Nancy Jones
San Antonio

Dear Sir: We think it would have been appropriate to stress that Germans started the war, that many of the people you now have compassion for had no compassion for others when they thought they could conquer Europe.
Jerry Steinman
West Nyack, New York

Dear Sir: I cannot help agreeing with Dr. Max Heinrich, director of the tracing service, who was quoted in the article as saying that his work "is certain to turn you into a pacifist."

I have been working with the Red Cross Tracing Service through our local chapter for the last three years. Fortunately, I have had a measure of success in finding members of my family in Germany. Now that channels with Eastern Europe are a little better, perhaps many others will be able to trace missing members of their families.
Mrs. David Fedders
Cincinnati

Bill Mauldin's Revolution

Dear Sir: If I had the money, I'd commission Bill Mauldin to rewrite all the history books.

His laser-beam eye sees through all the manufactured godlike qualities ascribed to political and military leaders by historians determined that their countries shall have their heroes.

Mauldin's descriptions of Washington's physical disabilities and eccentricities do not, for me, lessen one whit my respect for what he did for our country. In fact, I like him even more because he has become more human.
Mrs. J. R. McCormick
Spring Valley, New York

Dear Sir: No GI of World War II whom I know feels or felt that Mauldin was "on his side." Mauldin was on Mauldin's side.

If his criticism of Washington, von Steuben and others is based on his experience in combat under the likes of such leaders, you owe it to us, for history's sake, to print the true account of Bill Mauldin's service during World War II. It might inspire us and justify his exposure of the scoundrels who caused it all.
Roscoe C. Wilson
Harrods Creek, Kentucky
Mauldin was awarded the Purple Heart for being wounded in action on December 11, 1943, while serving in the Mediterranean Theater of Operations with the 45th Infantry Division. He received the Legion of Merit for his cartoons in Stars and Stripes. *His citation reads, in part: "[His cartoons] live as an accurate history of a difficult campaign seen through the eyes of the common soldier. . . . During most of this time he has lived as a front-line soldier, has gathered his ideas by being continually in the combat zone, and has contributed greatly to the morale of the combat soldier of this theater."* Ed.

Dear Sir: Several statements in Bill Mauldin's article need criticism, if not correction. His verbal and artistic attack on Baron von Steuben's contributions to the American cause was uncalled for.

He ridicules the one decisive element, discipline, the key to the remarkable conversion into an army which "finally was able to face any army on even terms." The "Drillmaster of the Revolution" soon found that reliance on good solid reasoning assured the successful execution of his orders. His detailed book of rules and regulations is to this day a guide for military ordinance.

As to the "bogus rank," history tells us that on May 5, 1778, von Steuben was appointed by Congress inspector general with the pay and rank of major general—a promotion for capable, devoted services.
Rolf Hedemann
The Steuben Society of America
Valhalla, New York

Nightmare waves

Dear Sir: Although I have neither sailed on a large ship nor encountered any gigantic waves, I was intrigued by Peter Britton's article on nightmare waves. His description of the difference between tidal waves and tsunamis and the ways they are formed helps explain the old tales of sailing ships being swallowed by the ocean and the mysterious disappearances of large oceangoing vessels.
Alice A. Durachko
Clarence, Pennsylvania

Dear Sir: Most sea captains (myself in-

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President John Quincy Adams and his bride Louisa bought the original in France. During his administration, it graced the White House table. Their service is now in the Smithsonian Institution. This new interpretation harmonizes with any setting from classic to the most contemporary. Each piece is marked with both the Smithsonian and the Stieff hallmarks. We are pleased to offer it to you at the introductory price of $120 for a four-piece place setting (place fork, place knife, teaspoon, and salad fork).

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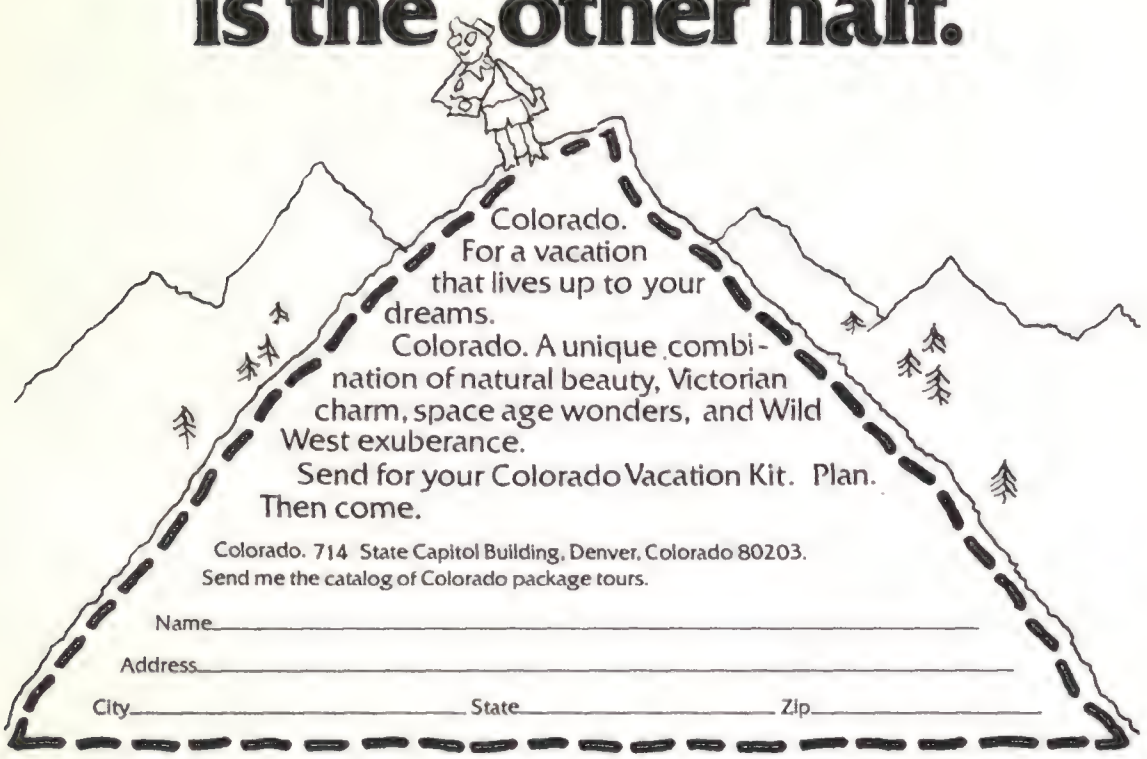
Planning your vacation is half the fun.

Colorado is the other half.



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cluded) believe that serious storm damage always occurs to someone else. When it does happen, it is only natural for the captain to look for causes that were beyond his control—such as the nightmare waves described in Mr. Britton's article. But the real insight gained from such an unsettling experience is that storm damage and sinkings do not occur because of the power of huge waves. The real causes are usually the perceived, greater power of the ship's schedule and inadequate readiness of the ship for heavy seas.

When a captain has the courage to ignore the pressures of his schedule and select courses and speeds that are 100 percent in the direction of riding out the storm, the chance of damage is almost negligible.

George P. Sotos, Captain, USN (Ret.)
Alexandria, Virginia

Two lady artists

Dear Sir: Miriam Troop's article on Colonial artists Henrietta Johnston and Patience Wright held an extra surprise for me—portraits of two of my ancestors. We have sepia prints of very similar portraits of Pierre Bacot and Marie Peronneau Bacot. In addition, we have a print of a portrait of their daughter, Elizabeth. These are the root ancestors upon which my mother joined the DAR many years ago; and my sister carries the middle name of Bacot. I am not certain that our prints are copies of the Johnston portraits. They may be copies or by another artist, but the faces were clearly the same —so much so that I easily knew who they were before reading your caption.

E. W. Stevenson, M.D.
Birmingham, Alabama

New Trans-Siberian Railroad

Dear Sir: Howard Sochurek's article on the Baikal-Amur Mainline held a bonus I'd like to share with you. The map showing the BAM route also shows the birthplace of Rudolf Nureyev. He was born on a train going along the banks of Lake Baikal near Irkutsk. His mother was traveling to meet her husband in Vladivostok. The map not only enriches the article, but it provides a special treasure for balletomanes.

Ilene Fauer
Paramus, New Jersey

Contax: A Step Beyond Nikon.

Your local Contax dealer is waiting to show you stunning audio/visual evidence of a precision instrument that steps beyond Nikon: Contax.

Go to your local Contax dealer. See his audio/visual presentation entitled *Contax: A Step Beyond*. Ask to hold a Contax RTS and a Nikon F2AS. Then compare.

Contax doesn't look like a Nikon.

Nikon is one of the most recognized cameras in America. Truly a fine camera.

Contax is one of the most recognized cameras in Europe and Asia. That's because the Contax RTS is the result of the advanced technology of German optics by Carl Zeiss, and high state-of-the-art Japanese electronics.

Both Contax and Nikon are recognized by their professional looks. But, *only a Contax looks like a Contax*.

Contax doesn't sound like a Nikon.

Nikon's shutter works mechanically. You hear a mechanical sound. Contax uses a sophisticated electromagnetic release system.

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Book review

Dear Sir: Your book review of *Alaska Crude: Visions of the Last Frontier* makes statements to which I, as one of the field engineering team that started the pipeline study in 1968, take exception. For example, the accident rate on this project was below the national average for the construction industry. If one were to accept the projected 273 deaths by one of the major contractors, then the six major contractors on the project should have experienced 1,638 deaths. As a matter of record, by mid-1977 there had been 29 construction-connected deaths.
Frank A. Therrell
Anchorage

Recap of 1977

Dear Sir: William Zinsser's column, "Recap of 1977: who *was* pultruded, anyway?" has to be the funniest possible existential statement about what it means to be middle-aged and middle-class in America. Congratulations to him for writing a modern classic.
Margrette L. Nelson
Flagstaff, Arizona

Hail to 14 forgotten Chiefs

Dear Sir: There are statements in Richard B. Morris' article in the January issue, "Meet the men who were Presidents before Washington," that I feel constitute an appalling reflection on my ancestor. The implication is that he was a usurper and that he invited Prince Henry, brother of Frederick II, of Prussia, to become king of the United States—acting "entirely on his own, without authorization of Congress or any committee thereof, nor did he ever take Congress into his confidence."
Nathaniel Gorham
Orchard Park, New York
Professor Morris says: "I agree that Gorham was not alone among some contemporaries who flirted with monarchical ideas but, so far as I know, he was the only *President to have been alleged to have put out feelers for the setting up of a monarchy in America. This charge by James Monroe lacks documentary substantiation but, coming from a contemporary, who himself was later President of the United States, it carries some weight and certainly cannot be ignored."* Ed.

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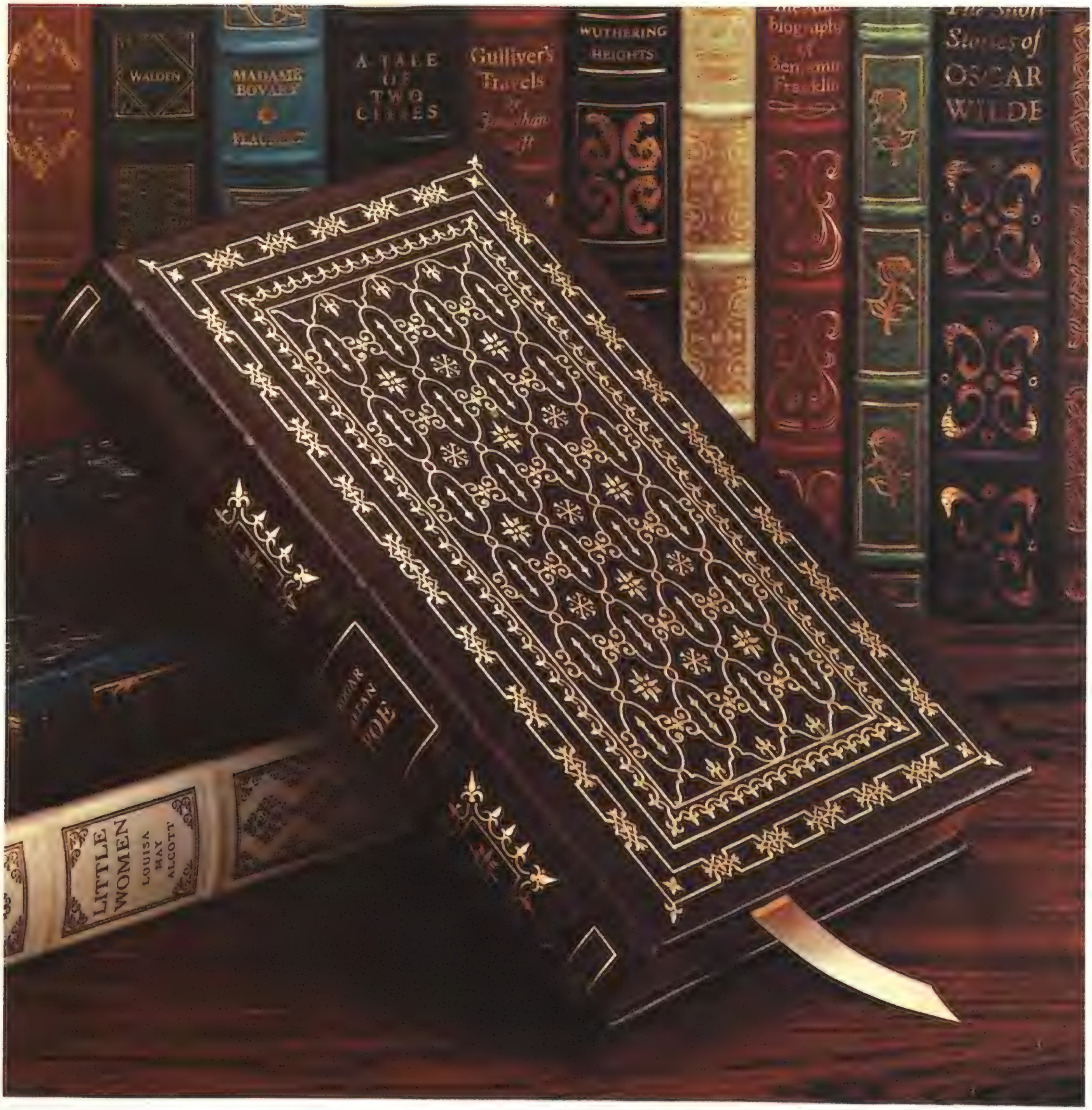

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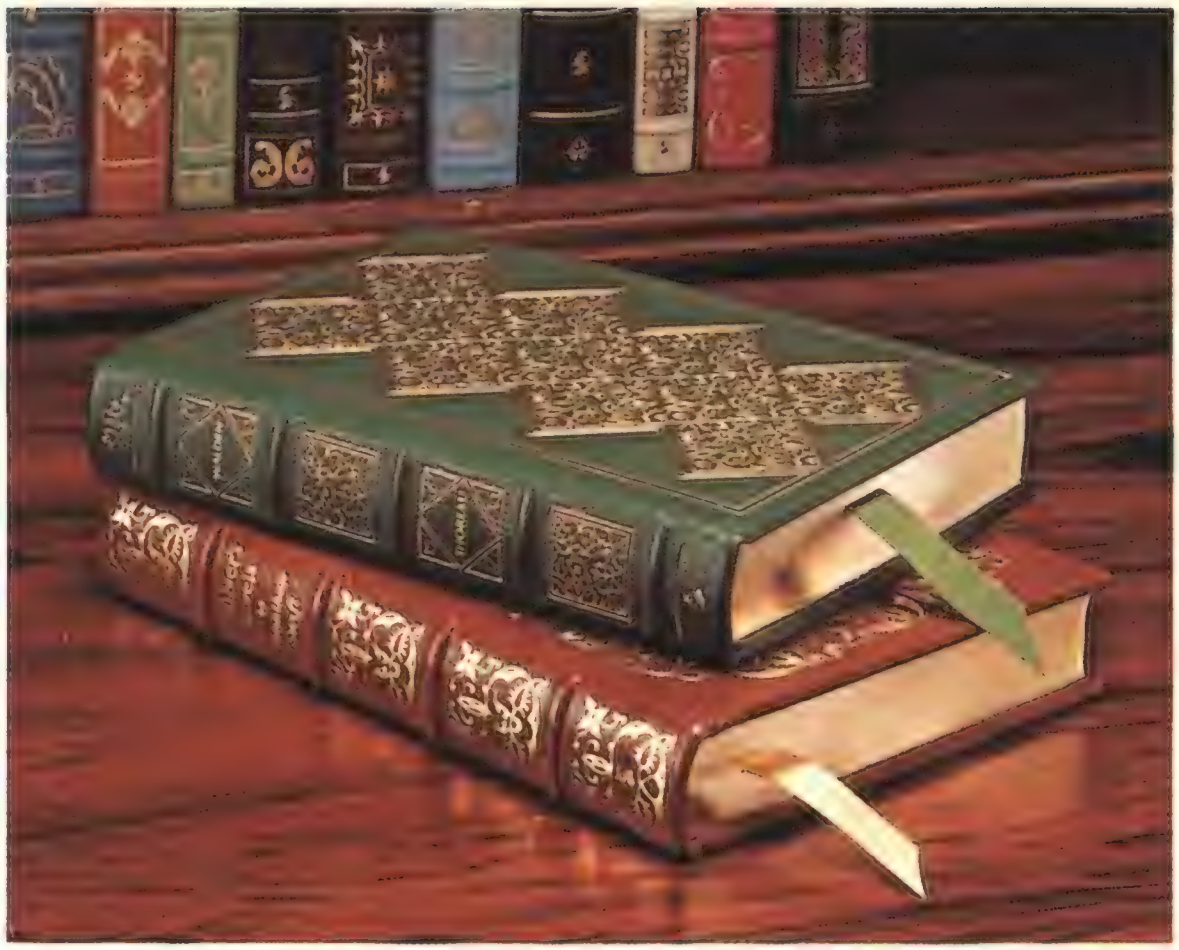

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Phenomena, comment and notes

The alternative energy pot boils faster, a second deluge and the end of nice civilized telephone lying

Southpaws are always in demand in baseball, which is most likely why young lefties are actively encouraged by the existence of plenty of left-handed mitts. In few other areas are lefties fostered by equipment suited to their peculiar approach to things. When was the last time you saw a left-handed banjo?

A case can now be made for such an instrument because, it turns out, left-handers have "superior musical processing ability." Diana Deutsch of the University of California, San Diego, has run pitch-memory experiments on 129 undergraduates of whom 53 were left-handed, some strongly and some moderately so. The rest were moderately or strongly right-handed.

The results, as reported in *Science* (Vol. 199, No. 4328), were that moderately left-handed subjects made the fewest mistakes in remembering tones.

It is Deutsch's opinion that moderately left-handed people have two locations in their brains—one in each hemisphere—where pitch information is stored, just as their speech functions operate out of both hemispheres. The rest of us, stuck with the use of one hemisphere in such matters, will just have to be resigned.

The coming of the new

A few years back, if you mentioned the phrase "alternative energy sources" at a cocktail party, anyone who could hear you thought you were talking about vita-

min pills. Nowadays scientific and technical journals bristle with studies and exhortations for this, that or the other alternative source:

• Two MIT studies have agreed that "a coal-dependent New England would mean 20 times as many health problems as a nuclear New England." Occupational hazards are higher because coal is dangerous to mine. Public effects would be greater, the reports say, because burning coal emits sulfur oxides, particulates (including organic particles that may be carcinogenic) and various heavy metals. The Environmental Protection Agency says SO_2 from a well-run coal plant would result in less than one mortality a year; one MIT report says a nuclear plant would cause one death every 28 years.

All very well, comments *Technology Review* (Vol. 80, No. 3), but serious nuclear matters remain to be dealt with—notably disposal of almost unimaginably long-lived radioactive wastes . . . and terrorism. Nobody, the magazine claims, "has yet discovered how to threaten a city with a lump of coal."

• *Science News* (Vol. 113, No. 1) reports that Barry Commoner, a vocal ecoprophet of the age and director of the Center for the Biology of Natural Systems in St. Louis, says critics of solar energy have been justified in saying that this alternative can't replace all space-heating needs unless a way to apply solar-generated electricity to space-heating technology can be found. But, says Commoner, a federal purchase program will bring down photovoltaic cell prices, so by 1983 it will be cheaper to use them than utility power for such things as streetlights.

What Commoner sees as a danger is that energy decisions made now—for the intensification of centralized power production, for example—will "foreclose introducing solar technologies later on."

• There are some places where solar technologies are already being introduced in a fairly big way. It is the sun that sets the wind to blowing, of course, so a windmill is a solar energy device. One place where there is always plenty of wind is the west Jutland coast of Denmark. And there, according to *New Scientist* (Vol. 77, No. 1087), at a group of colleges, the world's largest windmill has just gone into operation. Fifty-three meters tall, its three blades sweep a diameter of 54 meters (for the nonmetricated, that's about 59 yards) and that's a

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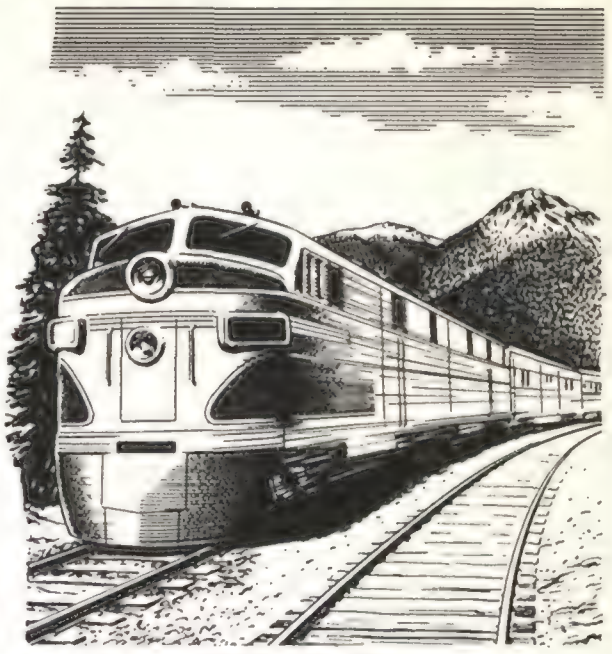

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very big windmill indeed. Its output will meet all the electricity and heating needs of the Tvind colleges, with some left over to sell to the Jutland utility.

It cost about $660,000 to build. Tvind researchers say that wind turbines could produce 20 percent of Denmark's energy requirements—the equivalent of five nuclear plants.

• Californians are wont to point out that if their state were a country, it would be the sixth largest (economically) in the free world. And not to be outdone by so tiny a country as Denmark, California has announced its own energy plans, which call for the expenditure of a half-billion dollars over the next five years.

In the first place, state officials were unsatisfied that the nuclear industry could dispose of its wastes as safely as state standards demand, so they have recommended a hold on a planned nuclear plant in the southern part of the state.

Instead, Governor Edmund G. Brown jr. proposes an Energy Development Authority which will put its considerable supply of eggs into a variety of baskets. The first $200 million, says *The Energy Daily* (Vol. 6, No. 8), would go to energy conservation; retrofitting and redesigning state and local government buildings, including the huge state university system, could save the equivalent of 1,000 megawatts of electrical capacity plus oil and gas equivalent to another 1,000 megawatts. Additional funds would be used to "buy hardware," says Wilson Clark, a frequent contributor to these pages who is now the governor's assistant for issues and planning. "We are not interested in paper studies."

What hardware? A coal gasification plant to power an existing utility that now burns oil. Designs for a new coal-fired plant with the most up-to-date environmental control equipment. Apparatus to capture 200 megawatts of geothermal capacity to show the way toward harnessing the state's estimated 20,000 megawatts of energy that lie underground in the form of heat. (A megawatt is 1,000 kilowatts. And 1,000 megawatts is roughly the capacity of the newest large nuclear power plants, while the newest large coal-fired plants average 800 megawatts.) Machinery to convert forest wastes into usable energy—a potential of up to 16,500 megawatts. And wind-powered turbines to pump irrigation water through mountain passes.

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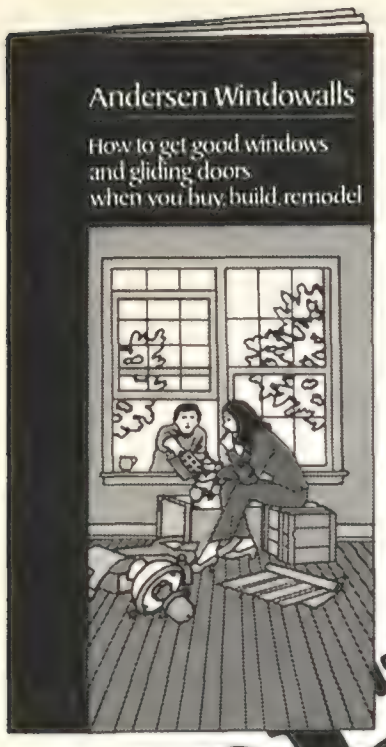

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The need for haste

One can only devoutly hope these alternatives come on line soon. It is, perhaps, too late already if you believe a report by J. H. Mercer of Ohio State University's Institute of Polar Studies in *Nature* (Vol. 271, No. 5643), a journal not given to publishing crackpot alarmists.

Dr. Mercer, after much study, has concluded that if we humans continue to burn fossil fuels at our present accelerating growth rate, we will double the amount of carbon dioxide in the atmosphere in 50 years—that is, by around 2028. Now there have been a lot of reports and counter reports about what will happen if we get too much CO_2 in the atmosphere—the majority notion is that it will produce a greenhouse effect, warming the Earth. But how much and what the effects of any increase would be, and where the effects would occur, are matters men of goodwill disagree over. There are also people who say there is no warming trend, that if added CO_2 were going to be a problem, it should be detectable already—and it isn't.

But, Mercer points out, the cooling trend is in the northern hemisphere (Mercer believes it is a natural cycle soon to be overpowered by the greenhouse effect) and a warming trend—of about one degree C in the past 30 years or so—is now going on in the Southern Hemisphere, in places like Australia (West Antarctica has warmed up as much as two degrees C in 15 years).

To be brief, Mercer asserts that if present models of climate and other meteorological matters are correct, and if we go on the way we are now, "a critical level of warmth will have been passed in high southern latitudes 50 years from now, and deglaciation of West Antarctica will be imminent or in progress." It would happen quickly, he predicts, so in a very short period the sea level along most coastlines around the world would rise by five meters.

Good-bye low-lying sections of Florida, the Netherlands and sections of thousands of coastal cities and settlements around the globe. The only people who could possibly benefit are city planners, who will get a chance to start all over again on higher ground. Mercer hasn't much to offer by way of solution except to say that if we burn fossil fuels at the *present* rate, rather than at a growing

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rate, we might hold off the great inundation for 200 years.

The end comes in a rain of truth

It probably doesn't make much difference one way or the other if we lose all that real estate to the vanishing Antarctic glacier, but the end of civilization as we know it is now clearly in sight. This sad event is presaged by an electronic device a bit larger than a pocket calculator that has red and green lights that blink under certain circumstances. It is called a Hagoth and advertisements for it have been appearing in recent months. It is a voice-stress analyzer and its maker says that, plugged in to your phone, it will enable you to tell if the salesman at the other end is lying and, if so, whether the lie is of the white variety or more severe Green lights indicate truth; red ones untruth. The more red ones that blink, the deeper the deception.

This doomsday machine is available for $1,500—it's being pitched at businessmen now and, like the polygraph, does not yet produce evidence admissible in court—but probably its price will plummet before too many more months go by, putting it (like calculators) in the hands of anybody—everybody. Then, the party will be over. Marriages, parent-child relations, communities, economics, politics, the entire social fabric—all of which depend for existence on people looking the other way while someone else tells a fib (*i.e.*, diplomacy)—will come to a screeching, ear-shattering heart-breaking halt. Truth will reign and the world will be at an end.

Let the floods come.

—JAMES K. PAGE JR.

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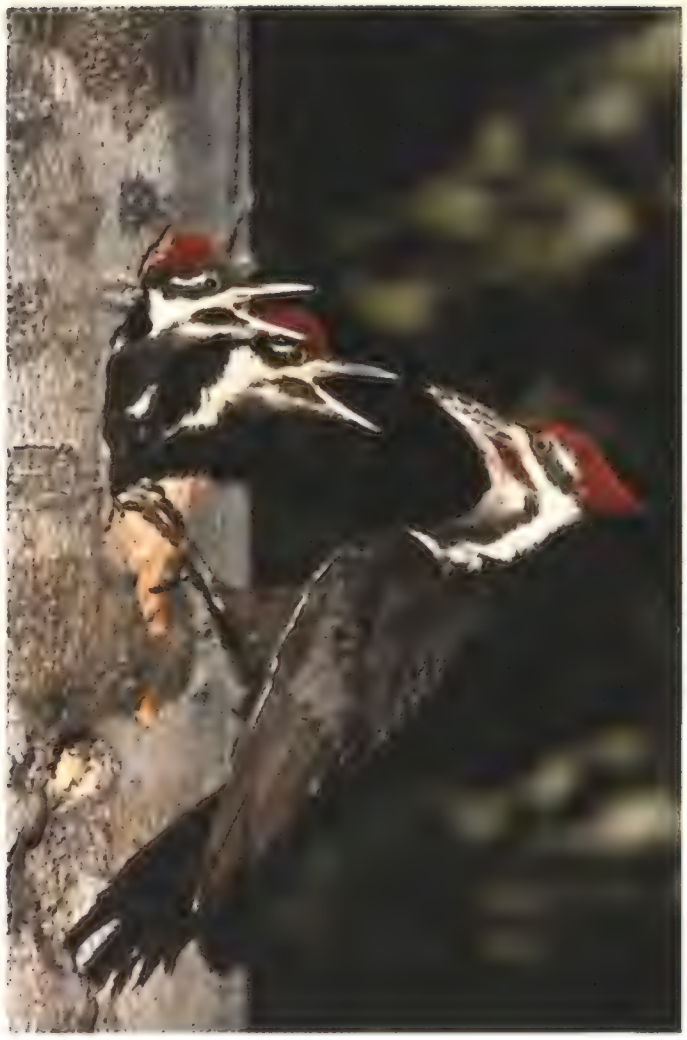

Lucky shots?

Hah!

Pictures like these you don't get by strolling along whistling a tune and whipping out your camera now and then. Here, for example, is a hint of

what it took to catch that pileated woodpecker tending her brood.

The bittern, freezing on her nest to blend in, was easier. Dick Robinson, our bird man, merely waited the days out until the eggs were about to hatch and her maternal juices suppressed her flight reaction.

Robinson, whose job with us is to tell Canadians how to get more out of their photography, has written a detailed and magnificently illustrated essay which leaves the impression that the way for a birder to understand wild birds and graduate from the numbers game of "life lists" is to photograph them. To follow his ingenious suggestions is most time-consuming, but they should prove inspiring to both the field biologist and those to whom time is given to be happily consumed. They appear in *The 10th Here's How,* Kodak Publication No. AE-110, available through photo retailers.

The book also contains how-to-do-it articles on photographing sports, crystal patterns by polarized light, wildflowers, nature trails, and attractive specimens of humanity in a home studio. Mr. Robinson would prefer you turn your mind to one of those themes if you know you are the type for whom getting your bird pictures could become as important as the subsequent welfare of your feathered subject with its task of perpetuating its own species.

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In Charles Marion Russell's *Camp Cook's Troubles*, you share one of the unexpected surprises of a cowboy's life on the trail—as chuckwagon utensils are sent flying by the hooves of a bucking bronco. You feel the tension in the air as the flinty-eyed lawman in E. C. Ward's *Enter the Law* rides down the main street of a frontier town. See the hope and determination written on the faces of westward-bound pioneers in George Caleb Bingham's *The Emigration of Daniel Boone.*

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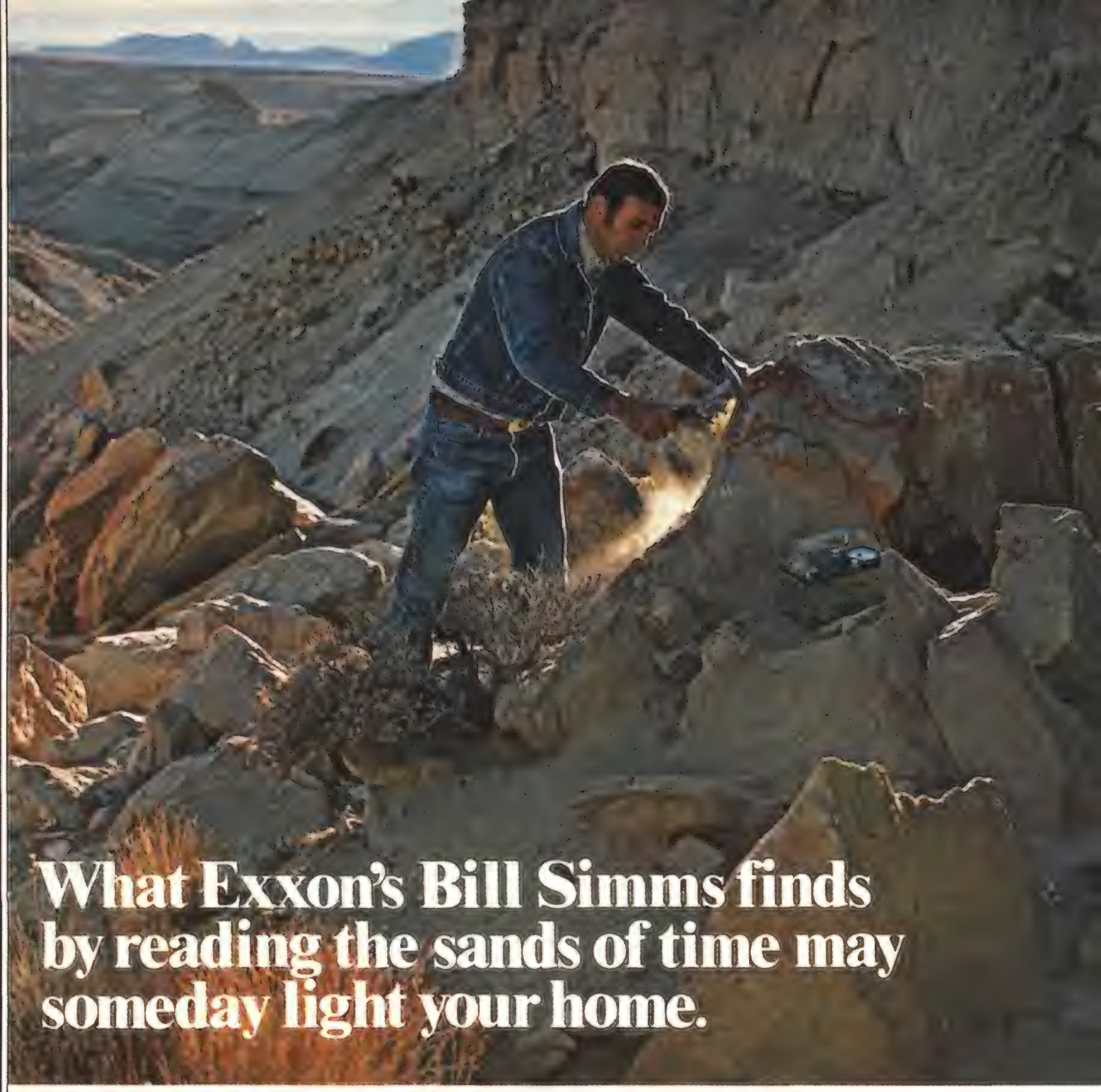

What Exxon's Bill Simms finds by reading the sands of time may someday light your home.

To Exxon geologist Bill Simms, Utah's remote canyon country reads like a book: layer upon layer of sandstone laid down by ancient rivers, then carved into stately monuments by the mighty Colorado River. Looking at a canyon wall, Bill can read the "sands of time" and interpret conditions that may have caused uranium to be deposited millions of years ago.

Although Exxon is already producing uranium ore at our mine near Douglas, Wyoming, Bill and other Exxon geologists are searching for more uranium because our nation needs even more electrical energy. The expansion needs of the electric utilities will substantially increase demand for uranium to fuel nuclear power plants.

Knowing how it was deposited is only one facet of the knowledge Bill needs to find uranium today. Small amounts exist in many kinds of rock, but finding deposits large enough to justify mining is a challenge. Exxon geologists use many sources of geological data. One day they'll be in a helicopter scanning the country with sensitive instruments. The next, they'll be drilling exploratory holes to check radiation levels hundreds of feet below the surface and to bring up samples of the ancient "sands of time" for analysis.

Uranium exploration takes solid geological knowledge, plus money, time and plenty of optimism. Exxon has brought all these to the search for uranium. Being an oil company has helped us with the technical and managerial expertise needed to become a supplier of the uranium fuel that's helping electric utilities provide light, heat and power for hundreds of thousands of American homes.

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Around the Mall and beyond

On January 20, 1778, Captain James Cook brought his two vessels into a small harbor on the island of Kauai. This was the first recorded discovery of Hawaii by whites. Exactly 200 years later, Secretary S. Dillon Ripley brought his eloquence to bear upon the East-West Center in Honolulu, thus setting off a chain of Smithsonian events that might be described as the Institution's discovery of the 50th state.

Sure, we're a little late, but let's face it, the islands are a long, expensive distance from Washington, and for years they have seemed to exist mainly for transients in aloha shirts. What we officially noted is that Hawaii has a stable society with splendid museums and galleries and scientific interests. So Cook's Bicentennial gave us a chance to run some of our Institution past the Hawaiians—5,600 of them are Smithsonian Associates—and I must say they ate it up.

Secretary Ripley's speech could have dealt with his concept of the museum as a seductive and rewarding place of education or with the importance of enjoyment within the learning process—both good Smithsonian subjects—but he chose an important local topic, the need for Hawaiians to get serious about wildlife preservation.

He could speak with a certain extra authority since he helped save the Hawaiian goose, the nene, from extinction. This bird, looking somewhat like our familiar Canada goose, was nearly wiped out after white settlement in the islands because it was such a tasty change from fish and pig and poi. Now it's thriving in pens and in the wild, especially on its native sod, the "Big Island," Hawaii. The nene is shy. Apparently it has a sort of genetic aversion to people, perhaps imaging every human being to salivate at sight of it.

Mr. Ripley's Dillingham Lecture was only the opening of a whole Smithsonian act in Hawaii, inspired by the James Cook Bicentennial. Paul Desautels, our curator of gems and minerals, talked about jade and exhibited some for the citizens of Honolulu, who know a good deal about jade since so much of it comes from around the Pacific. Richard Fiske, a curator in the Department of Mineral Sciences, gave a talk on volcano watching, one of the few sedentary occupations of otherwise vigorous Hawaiians—if you can equate risking a skyward fling atop a gout of erupting lava with being sedentary.

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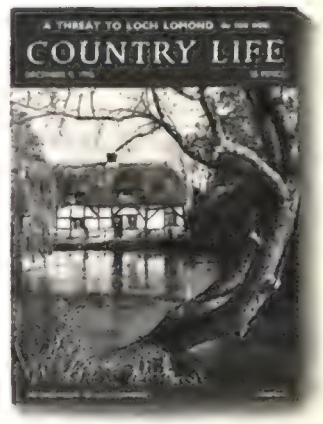

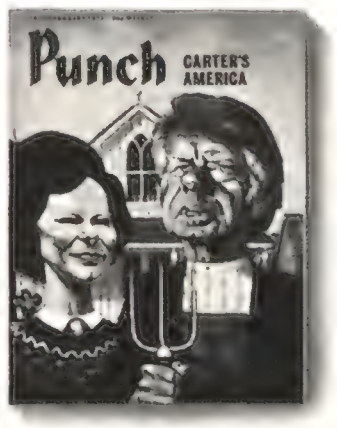

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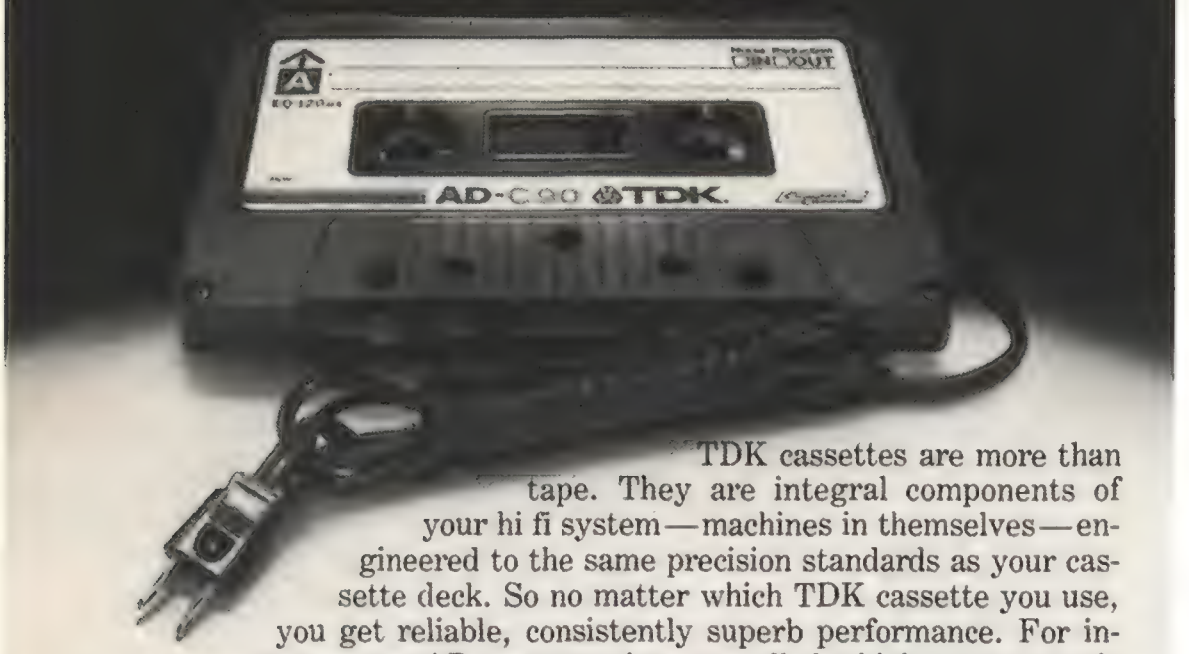

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Marc Pachter, historian at the National Portrait Gallery, spoke on early Oriental viewpoints on Americans. Charles Millard, chief curator at the Hirshhorn, discussed the sculpture of Edgar Degas.

There was more: Herman Viola, director of the National Anthropological Archives here at the Institution, brought over a selection of South Seas artifacts collected by Lieutenant Charles Wilkes of the U.S. Navy, who charted the Pacific in the tradition of Cook between 1838 and 1842. Lee Houchins of the Museum of History and Technology talked about the early American whalers and merchants who did so much to "open" Hawaii to American trade—and perchance to ruin a fair bit of it, as James Michener makes obvious in his novel *Hawaii*.

Finally, for four days in a row in early February, the Chamber Players from the Division of Musical Instruments (see this column for last October) put on concerts, workshops and lectures.

Every Smithsonian event was oversubscribed. Tickets, in fact, went long before the dates of the happenings. Only the no-shows presented gaps in the audiences. These are the people who cannot come, for one reason or another, and fail to notify the hall or turn in their tickets for the benefit of others.

So the 50th state got a large dose of the Smithsonian. But what's perhaps more important is that the Institution got a clear view of the real Hawaii. Like Mr. Ripley's speech, some of the subsequent events took place in the East-West Center, an academic conglomerate that requires some explaining. It consists of five separate institutes, all aimed toward solving specific problems shared by cultures and nations of the East and West. There are institutes for Communication, for Culture Learning, for Population and the combination of Environment and Policy. The fifth one is labeled Resource Systems.

The titles are obviously vague because the areas of responsibility are vast. Dealing with problems of the Pacific is a bit like raking the sand on a Hawaiian beach. Even to attempt it indicates that our fellow citizens out there in the Pacific are concerned with a great deal more than lilting guitars and swaying grass skirts.

The Center holds down a few acres adjacent to the Manoa campus of the University of Hawaii in Honolulu. This is a delightful place with light and airy

Memories are made in Singapore

5.30 am
Watched fishermen haul in the day's catch at a kelong — enjoyed a longtong breakfast in a kampong. Everyone spoke English.

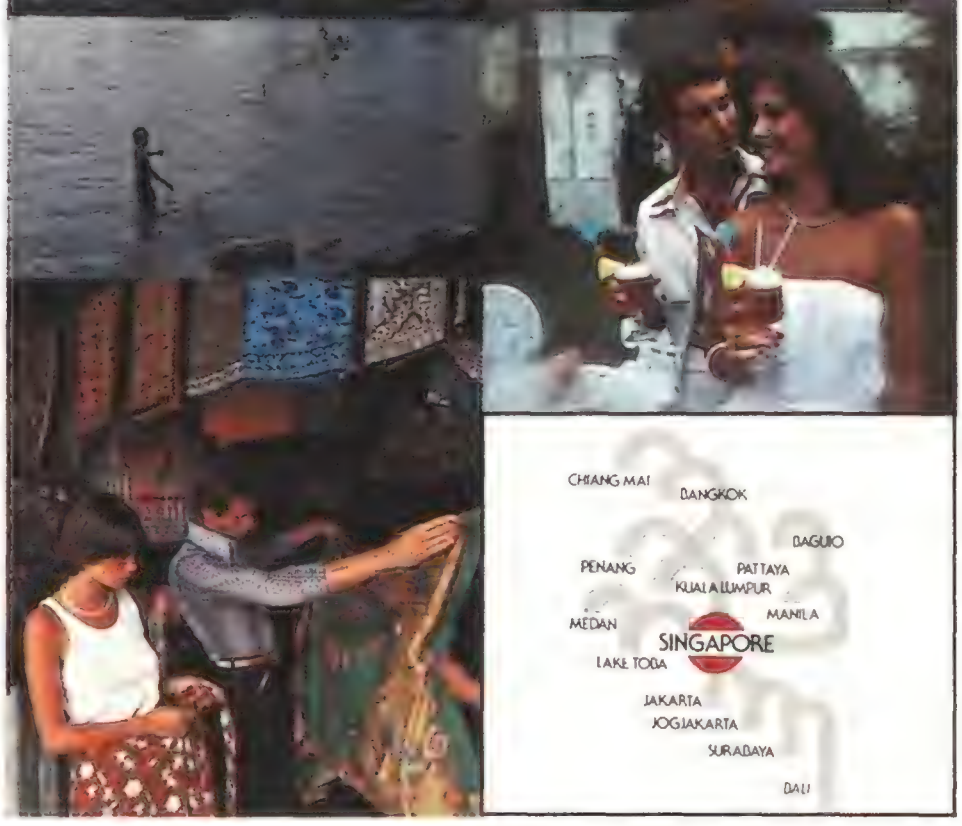
1.00 pm
Had Tim Sum lunch at an Emperor's Palace. 32 delicacies served by Chinese handmaidens.

4.00 pm
Visited a tropical sanctuary of over 7,000 birds of different species. Saw the Chinese and Japanese gardens. Singapore is the only place where you can be at two places at once.

6.30 am
Watched the dawn break over the East Coast Lagoon. Admired the Singapore skyline of this clean, green city.

7.00 pm
Was transported to Raffles Hotel in a trishaw for dinner. Had a famous Singapore Gin Sling.

9.00 am
The Market or the Mosque? — what a choice. The Market at Geylang was exceptional. They were practically giving away their Batik. Bought wooden clogs to match all for $10.



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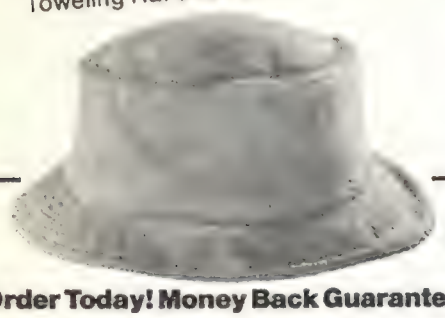

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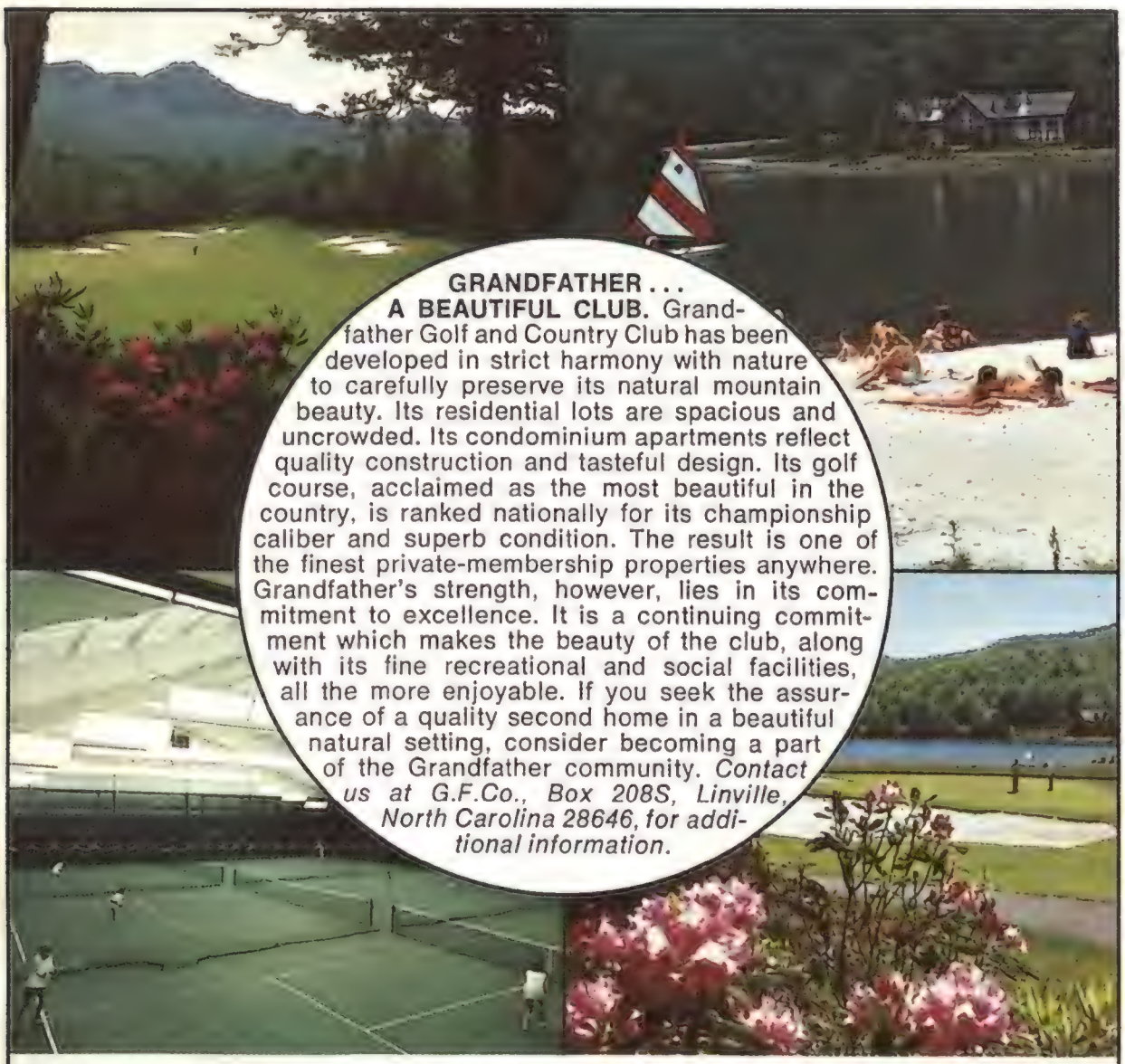

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buildings, occasional pagodas, gardens and groves. Behind one of the Center's fine new buildings a winding stream has been landscaped into a Japanese garden with cropped lawn reaching to rocky pools and rills where carp loll about—enormous, multihued fish obviously lying in wait for small boys to fall in.

In this enticing setting, serious work goes on involving a community of nations as diverse as the Pacific is large. I visited the Center (at this time I must admit to having dodged some of our mainland winter in the interest of the "beyond" part of this column's title) at the time of a seminar attended by representatives of Australia, Indonesia, Korea, Malaysia, New Zealand, Papua New Guinea, Singapore, Japan, Fiji, Western Samoa and the United States. These are only some of the Pacific community of nations.

Some Smithsonian events occurred at the Honolulu Academy of Arts, a privately funded organization which holds some fine work. It occupies a beautiful, sprawling old building in the historic part of the city, and its delicious courts and gardens entrap visitors, offering cool corners where plants and sculpture blend. I was entrapped by them, also by the Japanese art. Sure, I've seen it at the Freer, but this time it got to me, especially the figures, expressed with such sureness and humor. I was astonished to find one example dating from the 12th century.

The Academy is 51 years old and occupies the site of the home of one of the city's great ladies, Mrs. Charles Montague Cooke. She built up such a large collection that it sort of shoved her out of her own house. So she razed it, donated the property for a museum and moved up the hill to a Honolulu suburb.

The Bernice P. Bishop Museum hosted still other Smithsonian happenings. This is a superb museum of the Pacific, rich with the feather capes and strangely Grecian-looking helmets fashioned after those the early Polynesian settlers brought. There are also appurtenances of early whalers and relics of the great 19th-century missionary intrusion which submerged native Hawaiians in such Calvinistic zeal that undraped wahines eagerly accepted Mother Hubbard dresses donated by missionary wives—and so inspired the muumuu of today.

The Bishop was featuring a special display of Captain Cook's mementos when I visited—impressive and significant. But

Printer Break-through

A new 10-digit display calculator with the world's first dual-element integrated printing head will revolutionize the printing calculator.

The full-featured $89.95 Canon P10-D with its one-year parts and labor limited warranty is the greatest printer value ever offered by JS&A.

Hats off to IBM. Their single-element typing system did away with typewriter keys and started a new technology.

The new Canon P10-D printing calculator starts another new technology. Their dual-element printing system does away with the standard printing head which required a separate disc for each column. The Canon has only two discs—one with digits and the other with symbols.

The P10-D head weighs only ½ ounce compared to 31 ounces in a typical printing head. Its motor weighs only nine ounces—again much less than the heavier conventional motors required to drive larger heads. The Canon motor is smaller, lighter and more efficient because it moves less weight.

THE MOST EFFICIENT SYSTEM

The printing head is controlled by an LSI (large scale integrated circuit). As you press a key, a pulse is generated from this circuit and sent to the motor which does two things: 1) positions the two discs to print the numbers or symbols and 2) glides the numeric disc across the ten column width of the paper.

Conventional printers print from metal discs through thick fabric ribbon onto paper. The Canon system prints directly on paper so each impression is sharp, clear and easy to read. The synthetic polymer disc is first inked by a special cartridge before it prints. Each ink cartridge is easily replaceable. The cartridge lasts for more than 15 rolls of paper at a cost of 17¢ per roll—far less than any other system.

PLAIN PAPER PLUS

Using standard paper tape is only one of several advantages that make the Canon a truly spectacular value. Here are some other exciting new features:

Dual Power Operate the Canon from either your AC outlet or its built-in rechargeable batteries. It's totally portable, yet it also makes a handsome desk calculator.

Dual Display Just flip a switch and the 10-digit large green fluorescent display can be used with or without the printer.

Space-Age Styling Compare the sleek appearance of the Canon with any other printer. It's small enough to fit in your briefcase and large enough to use as a space-saving desk unit. It measures only 1¾" x 4¼" x 8½", weighs only 24 ounces and the paper tucks into the body of the unit—perfect for travel.

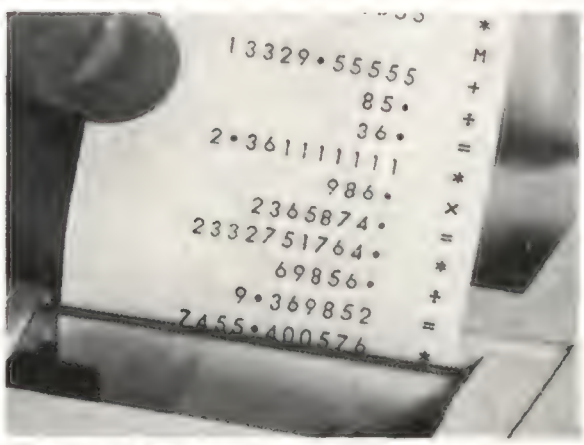
Buffered Keyboard If you enter your problems faster than the printer can print them out, don't worry. The unit's memory stores your keystrokes and prints them out in rapid succession.

We have always looked at small printers as gimmicks—calculators that lack many important features. We were surprised with the Canon. It has features that far exceed most printers costing hundreds of dollars more.

The following is a list of those features: 10 digit capacity • full four-key memory • addition, subtraction, multiplication and division • percentage key • add-on and discount calculations • power and reciprocal calculations • repeat calculations • add-mode • switch for full-floating or second and third fixed decimal positions • round off or round down switch • paper tape advance.

There are other convenient features that make it perfect for people who spend hours at their calculators. There's a three-digit item counter that counts and prints out the number of entries while printing your total. The symbols on the right side of the tape tell you the nature of each entry. Even in its battery operated position, you could print out more than half a roll of tape before the unit signals you that its batteries are low.

The sleek appearance of the Canon P10-D makes it a handsome addition to any desk.



The direct-impression dual discs print cleaner and sharper on conventional paper tape.

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the regular displays in the main gallery—two balconies circling a central hall—still represent a thoughtful and complete picture of Hawaiian history.

One aspect of Hawaii can be appreciated only by a visit. That is the volcanism which made the islands in the first place and which keeps the mountains steaming and swelling and often burbling over. I saw the caldera at Kilauea, in a national park on the Big Island, and found myself impressed by the crusted lava surface with its steaming vents, by the bleak and devastated landscape, by picking up a rock on a pathway and finding it hot.

If by now everyone has the impression that Hawaii is a serious state full of culture and concern and geological truths, I feel delightfully guilt-free about my trip. Yet in honesty I must add that the trade winds are balmy, the sun rises out of the ocean and touches the mountaintops and then etches their furrowed slopes as its light moves down to sparkle the beaches. There are surfers, incredibly graceful, to see and pleasant waves to feel on your sun-kissed body, and music and laughter and the tinkle of ice to hear and leis to smell and mai-tais to taste.

Birds alight on the breakfast table to snap up crumbs. White pigeons nest in the palm fronds outside the hotel balcony. Two were sharing the job of incubating a pair of pale blue eggs. Usually the female was on duty, and she would stir restlessly when it was time for change of watch until the male arrived, walking reluctantly down a palm rib toward the nest. She would coo at him to hurry up and get to work, and at last, grumbling, he would take his place, shifting around on the eggs to get comfortable, sighing and burping and wishing he were back at the canoe club with the guys. And his mate, finally liberated, would head off for Ala Moana Shopping Center to pick up whatever bargains appeared.

Why do I get caught up in the activities of pigeons, which I hate? Perhaps one reason is that there's not much else along that line on Honolulu streets, not even many dogs and no cats. Polynesians used to eat dogs in the old days. But cats? I don't believe any of it.

I returned to our mainland winter to find that James Eddleman of Lubbock, Texas, carved a dozen birds out of basswood, and got them displayed in the Learning Center at the Museum of Natural History. I never imagined that wood carving could produce such things. Here was a bluejay with primaries fanned—each so finely made that it's no thicker than a real feather. The same with the spreading tail of the western meadowlark and the yellow-shafted flicker. Smoothed-down feathers, as on the robin and the bobwhite quail, are so meticulously striated that every barb is distinct.

This display will remain on view in the Learning Center through May.

My father's friend, Slocum, if shown a newborn infant, would invariably trot out that old Yankee aphorism: "I cud *whittle* a better-looking baby." Being a not very nice man, he thought this was funny. Damned if he could whittle better-looking birds.

—Edwards Park

Carved wooden birds: bluejay lands above a hummingbird probing carved flower. Yellow-shafted flicker dominates meadowlarks and a cardinal.

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By Gaylord Shaw

The search for dangerous dams– a program to head off disaster

After tragedies in Idaho and Georgia, the Corps of Engineers is inspecting 9,000 structures; many may be found unsafe

A brave lad named Peter, so the legend goes, saved Holland from disaster by discovering a leak in a dike and plugging it with his finger during a long, cold night until help arrived in the morning. "Even the little children in Holland," explains a published version of the century-old tale, "know that constant watchfulness is required to keep the rivers and oceans from overwhelming the country, and that a moment's neglect . . . may bring ruin and death to all."

For decades, the moral of the old story went unheeded in America.

As the nation busily built nearly 50,000 large dams to curb floods, store drinking water, irrigate crops, generate electricity, create recreation areas and spur industrial development, it too often neglected questions of the safety of the structures holding back the water. The result was a vast reservoir of danger. One scientific study concluded that in any year America's dams were 10,000 times more likely to cause a major disaster —one involving 1,000 or more deaths—than were 100 nuclear power plants. There were, it seemed, too many dikes, too few fingers.

Then two preventable dam disasters jarred the nation. On June 5, 1976, the Bureau of Reclamation's Teton Dam in Idaho (right), a structure as tall as a 30-story building, collapsed as it was being filled for the first time, unleashing 80 billion gallons of water. The disaster shook the federal dam-building bureaucracy and brought long-overdue reforms in the way government dams are built, operated and inspected.

1 As the Teton Dam began to give way, Jerry Dursteler, a construction worker, photographed signs of failure at 11:52.

2 Just five minutes later the break occurred and Dursteler's picture shows water surging from the base of the dam.

But for every federal dam, there are 25 large dams owned by states, cities, counties, power companies, farmers, land developers and other private interests. And, through the years, a regulatory gap allowed dangers posed by these nonfederal dams to go largely uncorrected—a lapse tragically illuminated on November 6, 1977, near Toccoa, Georgia, when the long-neglected Kelly Barnes Dam collapsed and sent 900,000 tons of water rushing downstream to wreck a college campus and take a frightful human toll.

The disaster caused President Carter to order the U.S. Army Corps of Engineers to begin a four-year, $70-million effort to inspect 9,000 nonfederal dams. These "high hazard" dams, as they are called, are not necessarily unsound, but they are so located that if they did fail, the resulting floods could cause substantial loss of life and property.

The need to identify America's dangerous dams is urgent. According to Dr. Bruce A. Tschantz, a University of Tennessee civil engineering professor and a White House consultant on dam safety, in any given year 25 to 30 of the nation's dams may break.

To be sure, Tschantz also points out that advances in engineering have led to a good safety record for major dams. But there are so many large dams and there is such a legacy of neglect that there may be yet more disasters before the backlog of hazards can be erased.

Other statistics show the national scope of the problem:

• Of the 49,422 large dams (each 25 feet or more in height or capable of impounding more than 16.3 million gallons of water) counted by the Corps of Engineers in a national inventory, about 39,000 have never been inspected by state or federal engineers. This is because many states have ineffective safety laws or none at all, and because the federal government waited five years to start inspections under a program voted by Congress in 1972, after dam collapses in West Virginia and South Dakota resulted in 300 deaths.

• New dams are being built at a phenomenal rate. Tschantz has found that on an average day, five new private dams are completed in America—double the rate of the 1950s. The biggest boom is in dams for recreational lakes, which are sometimes crude earthen structures built by real estate developers without engineering advice.

• The federal government has had few failures among its dams, but it has a long list of uncorrected safety problems, some of them identified more than a decade ago. The two major federal dam builders, the Corps of Engineers and the Bureau of Reclamation,

Gaylord Shaw, the Denver bureau chief for the Los Angeles Times, *has reported extensively on the subject of hazardous dams.*

3 By 12:10 the dam had collapsed and another photographer took this picture as 80 billion gallons of water started pouring out through the breach.

4 Downstream, the flood destroyed farms, homes and scores of pieces of agricultural machinery, many of which were later collected by the authorities.

have been reexamining their own dams lately. The Corps reported that 61 of its 500 dams "may not perform as well during extreme floods as intended. . . ." The Bureau of Reclamation found that 17 of its dams "require modification to prevent their failure" in "maximum probable" floods—that is, the worst likely to occur in a span of 1,000 years.

Federal dams at least are designed by professional engineers, are generally well maintained and cautiously operated, and undergo regular safety inspections. This is not true of many private dams, and experts like Tschantz rate the cumulative hazard they pose as many times greater than that of federal dams.

From his office on the University of Tennessee's Knoxville campus, the 39-year-old Tschantz began campaigning in 1970 for government action on unsafe dams. Through hundreds of letters and telephone calls, he was instrumental in enactment of a dam safety law in Tennessee, and he found an ally on Capitol Hill in Representative Leo J. Ryan, whose House subcommittee conducted extensive hearings on dam safety.

Last November the hearings resulted in a Congressional report which declared: "It is the height of irresponsibility to continue as we have . . . without a sense of urgency and priority on the part of Government to address the growing hazard. . . ." Three days after the report was issued, the Toccoa dam failed.

After the tragedy near Toccoa, Georgia, experts said that trees growing on dam contributed to failure.

The dam there dated from 1899, when a rock-and-timber structure was built across a fast-flowing mountain creek to impound water for a small hydroelectric plant. Later, Toccoa Falls Bible Institute chose the valley below as the site for its campus, took over the power plant and, in 1937, decided to construct an earthen embankment over the original dam, eventually raising the structure's height to 42 feet. In 1957, the school abandoned the power plant, and in the years that followed the dam was neglected. Pine trees grew to maturity on its downstream slope, sending roots deep into the dam's core (above). Portions of the steep embankment vanished in a landslide, and no one bothered with repairs. Water seeped almost continuously from the base of the dam. Finally, at 90 minutes past midnight on a Sunday in November, the weakened dam collapsed.

The Toccoa Creek reservoir was a relatively small one, but survivors of the calamity attested to the power that is unleashed when even a minor dam collapses. When the dam broke, in the valley below, Eldon Elsberry and two friends were on patrol in the campus fire department's Jeep. As the water hit, it overturned the vehicle. "One minute the water was inches deep, and the next I was swimming for my life," Elsberry

Corps inspectors examine spillway of Big Creek Dam near Mobile, Alabama. They found it was safe.

said later. "I saw the bank, and I made for it." He turned and saw one of his friends struggling in the water. "I reached for his hand. He went by so fast I couldn't touch him."

The water released by the dam's collapse weighed the same as 7,500 freight train locomotives and, as it crashed into a dormitory and ripped through a cluster of mobile homes where married students lived, screams of terror rose above the roar—"A sound I'll hear as long as I live," Elsberry said.

"A big wave took everything"

On the bank, he found a man who told him that he "got his two little girls out of his trailer and was going back for his wife and the other two children when he suddenly lost them. He said he had one child on the roof and was holding another so tight that he was scared he was hurting her. Then all of a sudden a big wave took everything. Even the little girl in his arms."

Later, in the debris, rescue teams found the bodies of 39 victims. Twenty were children.

In the gorge above the devastated campus, so much of the dam had washed away that investigators were unable to determine the precise cause of failure. But the head of a federal investigative board said the dam was "in generally poor condition. A proper inspection would likely have determined that there were some serious problems . . . the kinds of things that could have been caught and corrected."

Officials of the college said they had never hired a private consulting engineer to inspect the dam because they had no idea it had safety problems. The state didn't inspect it because Georgia had no law or program regulating any phase of dam construction or operation. The federal government didn't inspect it because the national dam safety program voted by Congress in 1972 had not been fully put into action.

A few days after the disaster in his home state, President Carter convened a Cabinet-room meeting and asked how soon the federal program could be in full operation. Several months, he was told. "Why not tomorrow?" the President asked.

With these marching orders, the Corps of Engineers had hundreds of inspectors in the field in a matter of days, whittling away at a list they had compiled of 9,000 potentially dangerous nonfederal dams. Of the first 230 they examined, they found ten to be so unsafe that their reservoirs were drained or other emergency remedial action was taken. At this rate, inspectors will find nearly 400 of the 9,000 dams to be unsafe. The cost of repairs could be in the many millions of dollars, and there is talk in Washington about low-interest loans or other assistance to help dam owners finance the repairs.

But for now, Corps inspectors aren't worrying about

who will pay for the repairs—they're having enough trouble simply locating the unregulated dams.

Toward dusk on a wind-chilled Friday last January, for instance, a tan Plymouth turned off the highway near Birmingham and bounced along an old mining road snaking through the mountains of northern Alabama. It passed a few houses and an abandoned scale where coal trucks once were weighed, then slowed where NO TRESPASSING signs were tacked to trees.

"It must be here somewhere," said the driver, Jack Ward, a Corps hydraulic engineer.

"We couldn't have missed it," agreed his front-seat passenger, William Wilson, a Corps structural engineer. "The guy swore it was the biggest privately built earth-fill dam in Alabama," he said, referring to a conversation he had had with a private engineer.

The car rounded a curve, and from the back seat Corps soils engineer John Norton interrupted: "What's that over there on the left? Is that it? Pull over, Jack."

The sedan stopped and the men got out. A hundred paces away, they could see a mass of brown earth and gray rock wedged between the valley's pine-clad walls. They had found their quarry: a dam about 70 feet high and 500 feet wide, impounding millions of gallons of water, apparently built for the sole purpose of providing lake frontage for a cluster of expensive new homes. As far as any records showed, it had never been inspected by federal or state engineers.

The team of Norton, Wilson and Ward was one of scores of Corps teams sent into the field at the President's orders. Each of the teams was instructed to collect all available engineering data on an individual dam's design, construction and operation, and then to make a "Phase I" visual inspection with emphasis on detecting evidence of leakage, erosion, seepage, undue settlement, cracking or improper functioning of drains. They also were told to survey the adequacy of the owner's operation and maintenance procedures, and to check whether the spillways could safely discharge excess water.

"Where's that water coming from?"

A Phase I inspection takes from three to five days, costs up to $7,500 and results in a detailed report to the dam's owner, the state's governor and district Corps officials. It also can bring a recommendation that a dam be subjected to a Phase II inspection. This more extensive, more expensive examination includes drilling for core samples and other scientific tests.

On this particular Friday near Birmingham, after a day's inspection of two other dams in the area, the engineers were curious about this "phantom" dam, so they trudged through the gathering darkness for a

Julian Larrouy, a Bureau of Reclamation maintenance chief, examines Lahontan Dam near Fallon, Nevada.

Up close, Larrouy finds "spalling"—deterioration of the concrete surface of Lahontan's spillway.

In part of dam's structure, a large area of crumbling concrete exposes reinforcing steel at center.

Near Houston, local authorities cut drainage ditch (entering picture from right) which threatened stability

quick, unofficial look. At its base they noticed water trickling from rocks alongside a corrugated metal pipe which stretched through the dam's core to provide an outlet for the lake's water.

"Hmmm. Where's that water coming from?" Ward said as he knelt for a closer look. "Is that seepage?"

Seepage occurs in many earthen dams, and is not considered a serious problem so long as it is closely monitored and controlled. This usually is accomplished by installing layers of porous material, such as sand and gravel, to act as drains that pass the water safely through the structure.

"I hope the water isn't coming along the outside of the pipe," Ward said. "That could be bad news." He cupped a handful of the trickling water. "It's clear—that's good news." Muddy water would have been a sign that the seep was picking up particles of soil as it passed through the dam. That would indicate "piping"—the engineering term for the internal erosion which can be fatal for an earthen dam. Piping was cited, for instance, as one cause of the collapse of the Teton Dam.

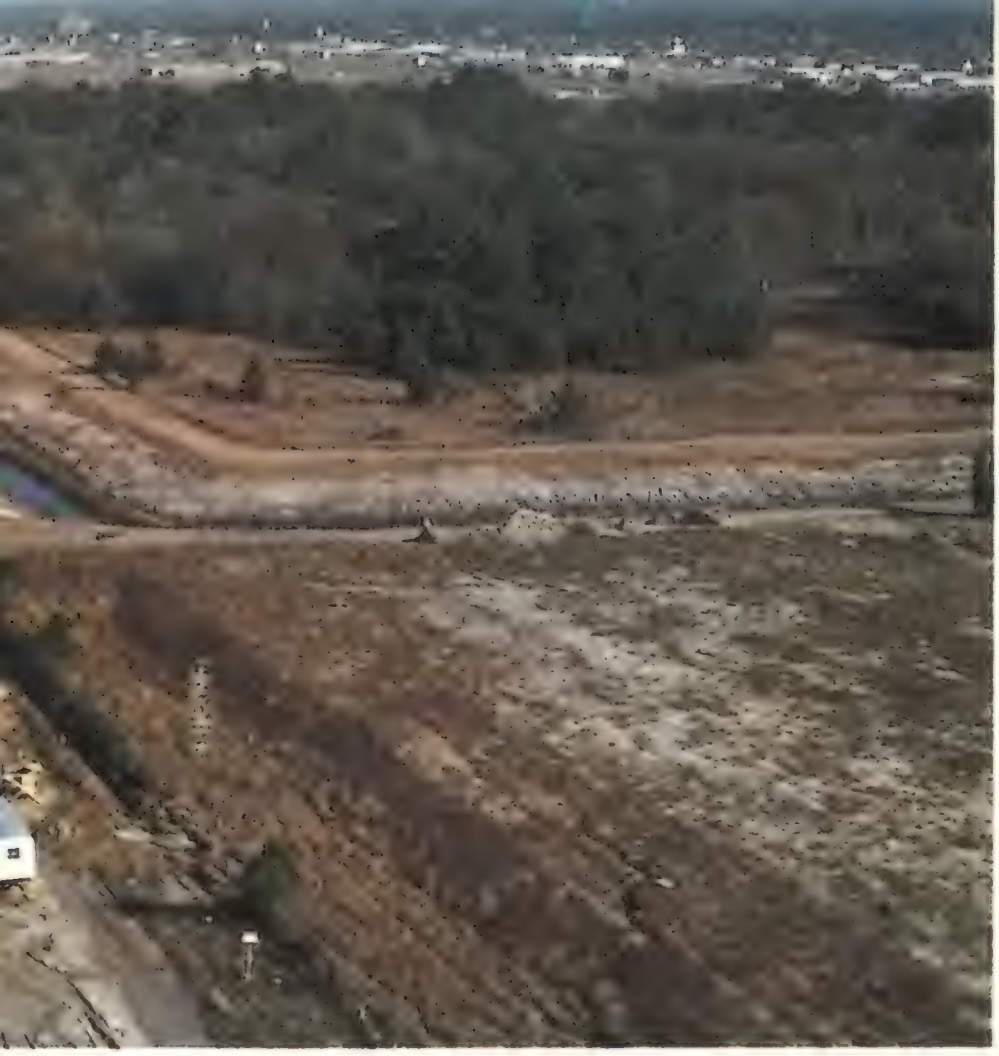
By now, Norton was climbing up the face of the dam. He stopped beside one of many clumps of young pine trees. "They ought to cut these down right now, before they get any bigger," he said. "Dam owners don't seem to realize they shouldn't let trees grow on the embankment." He explained that a mature tree's roots can weaken a dam by loosening its compacted core. Or, if the tree is toppled by wind or disease, the roots can rot and leave dangerous voids.

In the future, this dam near Birmingham and all like it in Alabama probably will be subjected to periodic safety inspections. The federal government is encouraging the states to take over regulation and inspection of nonfederal dams, and now Alabama, for the first time, is moving toward adoption of a law that will regulate construction of new dams and require regular examinations of existing ones.

In Missouri, where several previous attempts to adopt a dam safety law failed because of the opposition of farmers and contractors, a fresh effort is being made to enact such legislation. Until the law is on the books, "anyone may build a dam at any time, in almost any place, with complete disregard for safety," said Dr. J. Hadley Williams, a state official who long has been concerned about dam safety. In 1967 Williams started keeping a list of Missouri dam failures, but he could do nothing to prevent them. When his list reached a total of 26 several years ago, he quit keeping track.

Even states with existing laws have difficulty coping with an aging inventory of nonfederal dams. In Pennsylvania, the collapse of two half-century-old dams during a torrential rainstorm last summer aggravated flooding which caused some 70 deaths in the Johnstown region. Indeed, it was the collapse of an earthen dam that caused one of the nation's worst disasters—the great Johnstown flood of 1889, in which 2,200 people died.

Like Pennsylvania, California has learned tragic lessons from the past. It now has one of the nation's toughest dam safety programs, enacted after the 1928 collapse of St. Francis Dam northwest of Los Angeles killed 500 persons, and strengthened after the 1963 collapse of Baldwin Hills Dam in Los Angeles killed five. With a $2-million annual appropriation, California spends almost as much for dam safety as the other



of dam. Engineers are now digging trench at left, filling it with cementlike material to strengthen dam.

At leaky Navajo Dam in New Mexico, specialists from Bureau of Reclamation measure amount of seepage.

49 states combined. Gordon Dukleth, the official who managed California's program for many years, said the state's philosophy is simple: "If we have a dam failure, then we're not doing our job."

Certainly one of the reasons that many dams are in a precarious state is that federal and local agencies have placed greater priority on building new dams than on making safety modifications in existing ones.

This laggard pace of modification and repair results, at least in part, from a split in public opinion over the urgency of the problem. This division was reflected in the comments of Harold and Bob Yarwood, the father-son proprietors of a general store in Elk Creek, a tiny California community 130 miles north of San Francisco—and a few miles downstream from 50-year-old Stony Gorge Dam.

Young Bob Yarwood seemed worried. The store and nearby homes are clustered along the creek in the narrow valley, and he told a visitor: "I daresay if it let go, we'd be in a helluva fix." But Harold Yarwood didn't seem to share his son's concern. "I don't think there's anything to worry about," he said. "It may need a little patching here and there, but I don't think it is dangerous." Yet according to the Bureau of Reclamation, Stony Gorge is one of 17 Bureau dams that need modification to withstand heavy floods.

Until the Teton failure, the Bureau of Reclamation thought it had done a good job building more than 300 major dams in the Western United States. But after Teton collapsed, investigators found flaws in the dam's design and in procedures which allowed the mistakes to go undetected.

Lahontan Dam (p. 41) is an example of a dam which has not been repaired even though repairs were obviously called for. From a distance, the 120-foot-high Bureau dam in western Nevada looks safe, but up close a different picture emerges. Concrete in the dam's twin spillways is so deteriorated that it crumbles under the slightest pressure. In fact, Bureau of Reclamation engineers concluded that the spillways would collapse if they were ever used at 20 percent of their rated capacity. This would lead to the dam's rapid failure and, according to a Bureau report, "hundreds of people in mobile homes and trailers, on farms, roads and trails would be in danger of being trapped and overwhelmed by the flood." Lahontan's problems were documented in 1965, but it took the bureaucracy 12 years to produce a formal proposal that $5 million be spent for safety modifications—a proposal now awaiting action by Congress. Meanwhile, Lahontan's reservoir is being kept at two-thirds of its capacity as a precaution.

Navajo Dam (above) is another example. Soon after the 408-foot-high structure in northwestern New Mexico was completed by the Bureau in 1963, water was detected seeping through rock abutments on either side of the dam's earthen embankment. As the reservoir level rose, the leaks increased—to as much as 1.8 million gallons per day in late 1977. Finally, field officials recommended that $3 million be spent to seal off Navajo's seepage.

There are more prairie dogs than people downstream from Navajo Dam, but a pair of Corps dams with serious problems are located just above Houston, Texas, population 1.2 million. The dams, Addicks (pp. 42-43) and Barker, were built three decades ago to impound water briefly following heavy rains. Later, the region downstream flourished with homes and businesses. The Corps had to begin restricting releases of water from the reservoir because too heavy a flow caused flood damage. This meant the dams were being forced to do a job they weren't designed for—long-term impoundment rather than short-term. Seepage problems resulted, and were aggravated when local authorities excavated a drainage ditch near the base of one of the dams.

Now the Corps is spending $20 million—roughly twice the original cost of the dams—to solve the problems. The first step is to dig a 60-foot-deep, 1.6-mile-long trench at Addicks and fill it with impervious material to curb the seepage. Because so many people live downstream, it's an emergency job with crews working 20 hours a day, seven days a week. Meanwhile, Corps personnel there "are aware of distress signs . . . and make daily inspections."

Even as efforts are made to reduce the backlog of safety repairs on existing dams, the Bureau of Reclamation is caught in a swirl of controversy over whether its huge Auburn Dam (right), now under construction 30 miles northeast of Sacramento, California, could withstand a strong earthquake.

Auburn, costing $784 million, is planned to be an enormous structure, 685 feet high, and it will incorporate some of the latest ideas in dam design. Instead of relying on mass and thickness to hold back the water, the Bureau will anchor a thin, precisely engineered shell to abutments of strong, homogeneous rock. But the damsite is located in an area with a history of earthquake activity. Should the dam suddenly collapse when its reservoir was full, the resulting flood would imperil the lives of 750,000 persons, wreck the California state capital and three military bases, and ruin hundreds of thousands of acres of rich farmland. Because of questions about seismic risks, the Bureau of Reclamation has excavated 19 miles of trenches at the damsite and is spending $25 million to piece together the region's geologic history.

Since the dam would impound 800 billion gallons of water for farm irrigation and municipal use, the project has been strongly supported by agricultural interests and local officials. But, in the wake of the Teton disaster and heightened concern about dam safety, public opinion in California seems to have shifted. This was reflected last year when the *Sacramento Bee* observed: "We have always looked upon Auburn Dam as an essential project, of tremendous potential benefit to Northern California's growing water needs. We still do. Too many doubts about the earthquake danger remain, however. Californians, and especially those living in the path of the dam, need iron-clad assurance of its safety. . . ."

The Bureau already has invested $150 million in the

Supported by bedrock abutments (upper left and right of picture), Auburn Dam will span American River in California. On hillsides are trenches dug to evaluate chances of earthquake. Sacramento lies downstream.

dam's foundation and in other work, but is delaying the main construction contract until the seismic studies are complete. A final decision likely will be made at the highest levels of government sometime later this year.

Whatever the decision on Auburn Dam, concerned engineers like Bruce Tschantz hope that America at last is heeding the moral of the story about the Dutch boy and the hole in the dike, and that the lives lost at Teton and Toccoa won't have been lost in vain.

"Public interest in dam safety historically has risen to an outcry immediately following fatal dam failures, but it soon dies down and the nation resumes its complacency," Tschantz said one day recently in Knoxville. "We can learn from these failures if citizens demand that the state and federal governments act."

The professor paused to rummage through a stack of file folders. Finally he found what he was looking for—a Thomas Jefferson quote he had come across while reading during one of his frequent round trips to Washington. "This is really what it is all about," Tschantz said. "Listen: 'With all [our] blessings, what more is necessary to make us a happy and a prosperous people? Still one thing more, fellow citizens—a wise and frugal government, which shall restrain men from injuring one another. . . ."

By Benjamin Forgey

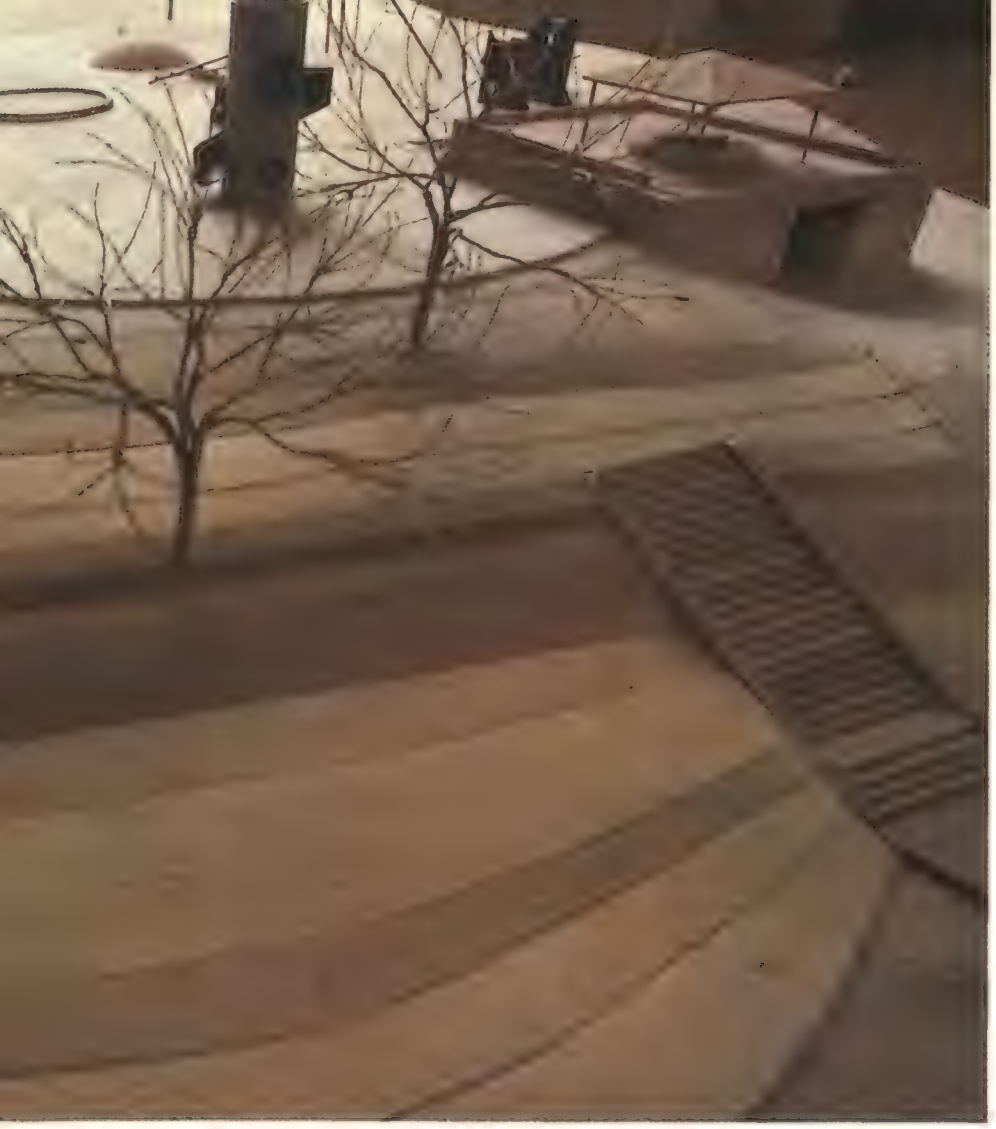
Isamu Noguchi's elegant world of space and function

Five-city tour will show work of a protean master of three-dimensional form who shapes both inner and outer environments

Model for playground and (below) its 1976 realization, Piedmont Park, Atlanta. "I like to think," Noguchi

A lot of things are coming together this spring for Isamu Noguchi. First, there will be the large exhibition of his sculptures and other projects that will go on a yearlong, five-city tour of the United States, beginning at the Walker Art Center in Minneapolis on April 23. Next month the artist will be in upstate New York to direct things as a group of huge gray blocks of Japanese granite, carved and treated in the singular Noguchi style, are hauled and hoisted into position atop a grassy hill at the Storm King Art Center (SMITHSONIAN, March 1977). In June, one of Noguchi's magnificent stone monoliths will be among the major artworks to confront visitors as they walk for the first time into the new East Building of the National Gallery of Art in Washington. The crowning touch, though, is the 13-acre Civic Center Plaza in downtown Detroit (cover), even now nearing completion, which Noguchi designed almost in its entirety.

It is, in a sense, about time for all of this to happen. Noguchi is 73. He has been working as an artist, draftsman, potter, sculptor, furniture- and theater-designer, lantern-maker, landscape architect, form-giver and all-around space-shaper for more than half a century. Throughout much of this period his importance as an artist—not to speak of his greatness—has been only grudgingly acknowledged. It is as if there are too many Noguchis to hold in the mind. "With Noguchi," says Martin Friedman, director of the Walker Art Center, "you get the feeling of being in many places at once."



says, "of playgrounds as primers of shape and function; simple, mysterious, and evocative: thus educational."

Noguchi has been, and still is, one of the more enigmatic luminaries in the annals of art. His personality and its logical extension in the material world—his art itself—are each as incredibly durable as the stones he loves and searches for the world over. But the man and his art are also difficult and secretive, almost impossible to classify or to pin down. They project opposing qualities: solitude and charm, order and explosiveness, harmony and dissonance, affirmation and despair.

It is Friedman's contention (and certainly Noguchi's, too) that there is a profound intellectual and stylistic consistency in the work, an overriding sensibility that unites the apparently disparate parts. Thus the forthcoming exhibition, entitled "Noguchi: Imaginary Landscapes," will focus as much upon Noguchi's environmental projects, realized and unrealized, and his stage sets and playgrounds, as upon individual works of sculpture. The aim: to make clear their crossbreeding.

This view of the wholeness of Noguchi's varied and far-flung enterprise has the feel of a fundamental truth. Perhaps it is only now that we can begin to perceive this truth, because the dizzy swirl of art fashions has largely been stilled and the cannonades of avant-garde ideologies have largely lost their zip. Also, Noguchi has been strong enough to weather a long, stormy life. By design or by luck, he has lived to become an old master of modernism.

Noguchi was born in Los Angeles in 1904. His father was Yone Noguchi, a widely known Japanese poet. His mother was Leonie Gilmour, an American writer and translator whose father had fled from Northern Ireland and whose mother was part American Indian. Noguchi's parents met in New York, in 1903. Their short, unhappy union had far-reaching consequences for their son, contributing especially to the fierce sense of isolation he has carried with him through the restless peregrinations of his life.

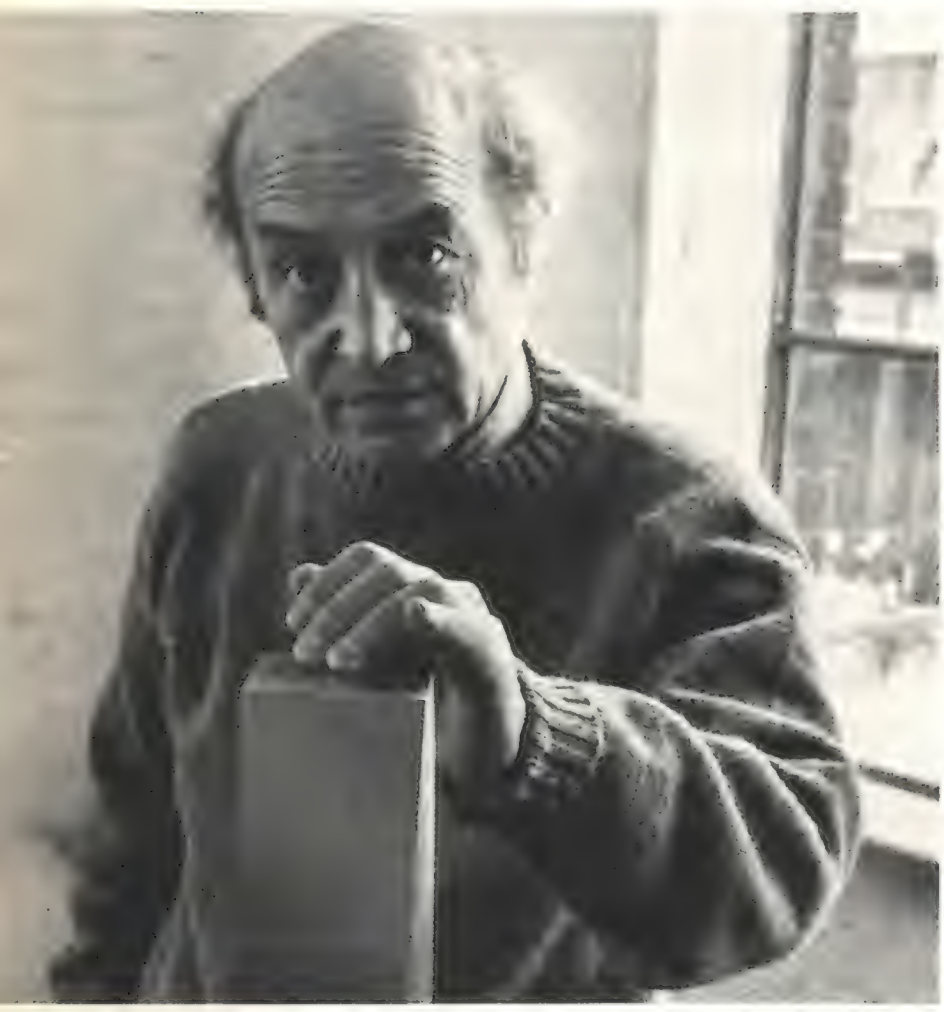
Thomas B. Hess, writing an early appreciation of Noguchi as a modern artist in 1946, observed how Noguchi "has carried his exile inside him like his skeleton . . . and has fused in his art the East and the West as they were fused in his body." More recently, in the Walker exhibition catalog, Friedman writes that Noguchi "operates in a curious limbo, culturally and artistically. In America he is regarded as a Japanese sculptor, and in Japan he is perceived as American."

Noguchi himself, relaxing after lunch in his Long Island City studio one chilly day last January, stated tartly, with no prodding, "I am not a Japanese artist. I am an American." And yet, only a decade ago, in the opening paragraph of his autobiography, *A Sculptor's*

Benjamin Forgey, art and architecture critic for the Washington Star, *wrote about the art of Michael Singer in January* SMITHSONIAN.

The Illusion of the Fifth Stone, 1967-68, was done in Japan, to which sculptor returns annually.

Noguchi's own garden, across from his studio, with works executed



Noguchi: "The essence of sculpture is for me perception of space, the continuum of existence."

World, he had written: "With my double nationality and double upbringing, where was my home? Where my affections? Where my identity? Japan or America, either, both—or the world?"

Yone Noguchi returned to Japan the year Isamu was born. The mother followed in 1906, but the couple soon separated. Isamu grew up with his mother in Chigasaki, a village near the sea, seldom seeing his father. His education was irregular; he attended the local grammar school, and then commuted to a French Jesuit elementary school in Yokohama.

One year, when he was about ten, he was kept out of school and semiapprenticed to a cabinetmaker in Chigasaki. He "instilled in me a great feeling for materials and the use of tools," Noguchi was to tell art critic Katharine Kuh nearly 50 years later.

When Noguchi was 13 it was decided that he should continue his education in the United States, and his mother sent him alone to Indiana to attend an experimental school she had read about in a magazine, one that stressed farming, carpentry and other practical skills. Noguchi arrived there in 1918 in time for summer camp, but he soon found himself literally alone: the school had been taken over by the U.S. Army.

After a wild year of independence, during which he camped out with two custodians in one of the school's

from 1956 to present. Foreground: *Unmei,* or—in Japanese—"Fate."

The base of a Noguchi sculpture is an integral part of its conception, as in this untitled piece, 1968.

deserted faculty buildings, Noguchi was unofficially adopted by Dr. Edward A. Rumely, founder of the forsaken school, who became, in Hess' interpretation, the "first of a series of substitute 'fathers' for the homeless, very lonely, exiled child. . . . By now the irony of exile at home is established."

Noguchi's talent having already manifested itself, Dr. Rumely, against his better judgment, acceded to the young student's desire to become an artist. He got in touch with his friend Gutzon Borglum (the Mount Rushmore sculptor) and arranged to have Noguchi employed as an apprentice in his Connecticut studio. The experience did not work out—Borglum told Noguchi he would never be a sculptor—so Noguchi followed Rumely's advice and in 1923 began premedical studies.

Noguchi was also working in a restaurant at night. Even so, he enrolled as a part-time scholarship student in an East Village settlement school—the Leonardo da Vinci Art School—run by Onorio Ruotolo, who, convinced that he had a burgeoning genius on his hands, gave Noguchi a one-man show after only three months in the school. Needless to say, premed studies soon were dropped.

This experience did not work out, either. Noguchi recalls that by age 21 he had run the academic gamut and was "disillusioned." By that time he had begun to look around Manhattan and had located those few places hospitable to the new modern art. The crucial eye-opener was the one-man exhibit at the Brummer Gallery in 1926 of work by Constantin Brancusi, the great Romanian sculptor. Noguchi had no doubts: "I was transfixed by his vision."

The crucial door-opener was Harry F. Guggenheim, who had seen a piece by Noguchi and suggested indirectly that he apply for a then-new Guggenheim fellowship for study abroad. Alfred Stieglitz wrote a recommendation for him, and he got the fellowship.

The day after he arrived in Paris in April 1927, Noguchi was seated at the Café Flore where, providentially, he met an acquaintance of Brancusi's. The day after that he visited the studio. Brancusi, then 51 and at the height of his powers (and his celebrity), told Noguchi that he did not accept students. Noguchi then asked if he needed a stonecutter. The great man agreed.

"Certainly I was no help to him whatsoever in the beginning," Noguchi later wrote, "and results could have been obtained without being so particular; but, no, it had to be done just his way no matter how long it took me to master it. The large saws he used must not be forced but gently cut of their own weight. The wide blade of the axe leaves its mark and that is how it should be left—the direct contact of man and matter."

Noguchi's world of space and shape

In 1961 Noguchi bought a small factory building in Long Island City, since augmented by a second,

In just this spirit are Noguchi's great stone monuments made today. Unquestionably, Brancusi exerted a lasting influence upon Noguchi, who was deeply receptive to the older artist's philosophy regarding materials and their treatment in the hands of an artist, and who shared Brancusi's profoundly respectful attitudes toward ancient, archaic sculpture and artifacts.

It is a debt Noguchi repeatedly acknowledges, and yet it has perhaps been made too much of, for the differences are great. Brancusi himself had predicted one difference when he told Noguchi "how lucky were the young people of the new generation such as myself, who could look forward to uninhibited and true abstractions, not like himself who always started out from some recognizable image in nature."

Not only are Noguchi's anthropomorphic and morphological forms more elusive than they are allusive—in short, more abstract—but Noguchi's work has absorbed and transformed other lessons of the century. Probably the most important of these is his expanded conception of space, which he got indirectly from the Constructivists and directly from his old friend Buckminster Fuller, and his belief in the mythical, symbolical potential of forms, which he shares with dancer and choreographer Martha Graham.

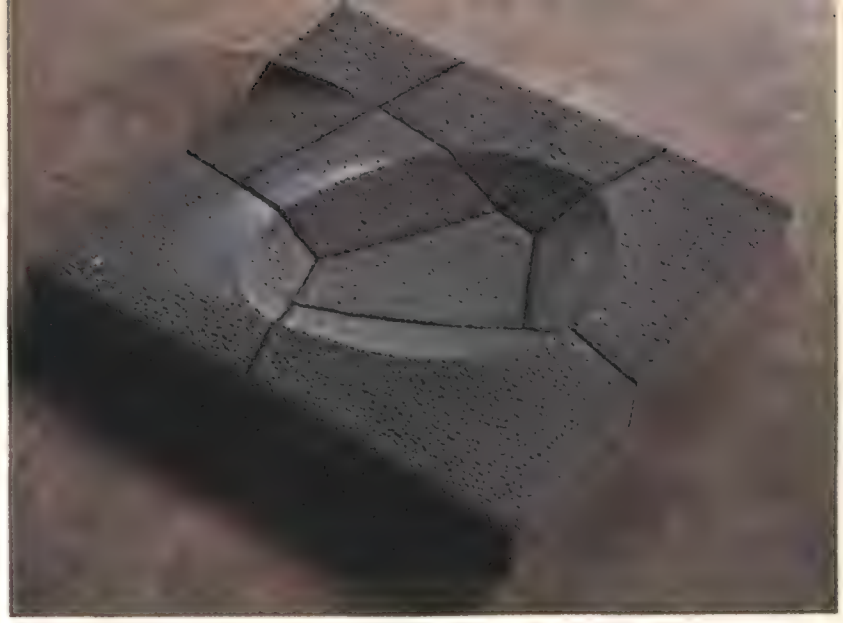
But all of this was less than clear back in 1929, when Noguchi returned to New York. For the next 15 years his career would follow the peculiar pattern of advance into the world and retreat from it that started when he left Ruotolo's studio.

In New York the penniless virtuoso began to have a big success as a maker of portrait sculptures. Then, having put together enough money, he gave himself a grant to take a trip to the Orient. He made brush drawings in Peking under the informal tutelage of a Chinese master, Ch'i Pai-shih. In Japan Noguchi sought out a master potter, Uno Jimmatsu, and made terracottas influenced by the ancient *haniwa* tomb figures.

Back in New York in 1932, he would have his first really important exhibition in 1934, a show teeming with ideas that was spitefully dismissed by major critics. Noguchi then went to Mexico, where he made an impressive 63-foot-long cement mural which, reflecting his personal bitterness and the mood of the Thirties, protested social injustice.

After Pearl Harbor, Noguchi was rudely awakened again to the split in his social identity and his very persona. He spent a painful sojourn as a voluntary internee at a camp for Nisei in the Arizona desert, building parks and playgrounds and participating in what

which contains working space, an office, a kitchen and living quarters. This is part of the second one .



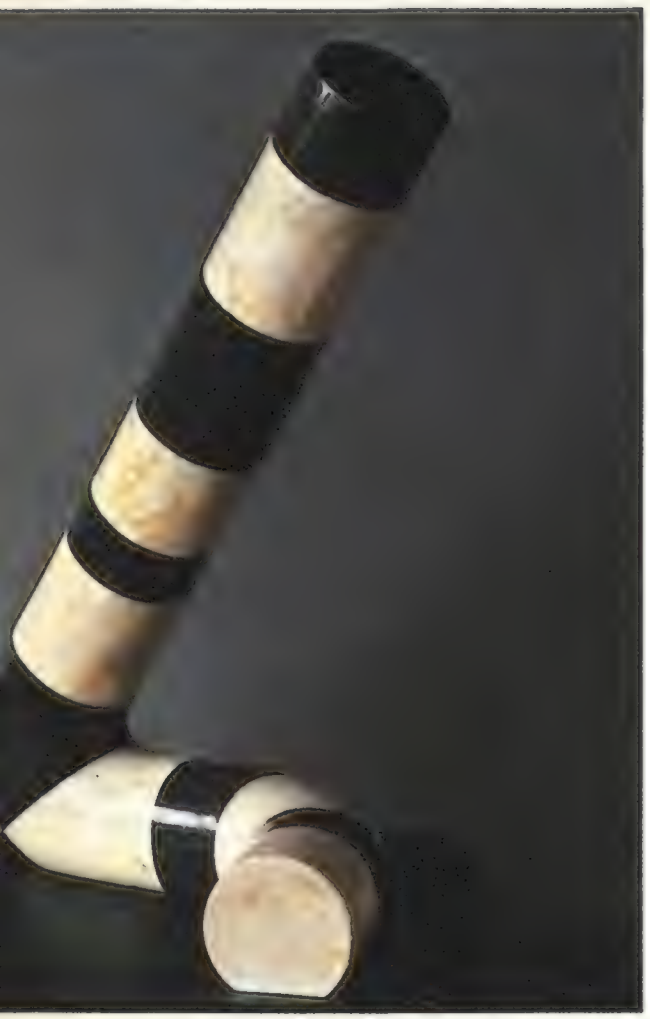
Noguchi's regard for and mastery of stone is evident in interlocking granite parts of *This Place,* 1968.

Cubic Pyramid, of highly polished granite, was done in 1969. Surface reflects light from studio windows.

Sky Mirror; 1967, is of basalt, its gleaming slanted top plateau contrasted with rough columnar surface.

he, along with a few idealists in the bureaucracy, thought could be a valuable, if enforced, communal experiment. It was a prison camp. Even though he was a volunteer, it took him seven months to get out.

In any event, it was during the war, following his release from the internment camp, that Noguchi began to produce his first really major body of work, building upon his experiments of the early Thirties. In the following decade Noguchi began to create a world of somber, multivalent sculptures that would firmly establish the lineaments of his style and emotional range. He began to receive some serious attention. The Museum of Modern Art in New York included one of his



Three works in marble displaying Noguchi's meticulous orchestration of materials: above, *The Bow*, of black petit granite and yellow marble, 1969; *Spirit's Flight*, 1970, serpentine and carrara marble; and *She* (small version), 1971, black Austrian porticoi and Portuguese rose aurora marble

bronzes, *Gregory* (opposite), in a 1946 exhibition called "Fourteen Americans." He also resumed with great intensity his involvement with Martha Graham, for whom he has designed perhaps 20 highly effective sets, and the world of modern dance.

In this sudden, powerful bursting out during the 1940s, Noguchi was not unlike other significant American artists of his generation such as the sculptor David Smith or the painters Jackson Pollock, Willem de Kooning, Mark Rothko and Barnett Newman. But Noguchi did it with his own special inflection, as always, and he never got the critical attention or acclaim that was accorded in time to these artists and those who followed during the 1950s and 1960s.

One of the things held against Noguchi, although not always verbalized, was that so much of his sculpture was made of stone when other modern sculptors worked with steel and other, newer materials. Noguchi, for his part, even today remains ambivalent about using other materials, although he has placed large steel sculptures in prominent locations in several of our major cities.

Usually, when he does these larger things, the material is a question of scale, flexibility, structural necessity, efficiency and economics, all important parts of Noguchi's approach to art. But stone and wood remain somehow responsive to his vision in a way that most other materials do not. In part, this has to do with Noguchi's approach to nature: stone is closer to the ancients, he feels, and stone is earth.

In our conversation last winter, he remarked that he felt it had been an esthetic mistake to have had several of his standing, totemic wooden pieces cast in bronze, that it took something essential away from them. "It was a tremendous advantage financially to do so, so I succumbed," he said impassively. "But I like doing things myself. I like the control. When something is made directly, what it is, is. There's no camouflage."

We were sitting at a circular table in a kitchen nook attached to the studio-offices he keeps in an industrial sector of Long Island City, close by the East River. Not far from Manhattan, but a world apart, dreary on the outside, inside a Noguchi miracle—spacious, spare rooms perfectly dotted with his sculptures, each as good as the last. At our table, Noguchi raised his hands quickly toward the enormous globular lamp, made of an off-white, translucent Japanese paper stretched over bamboo struts, that hovered above our heads—one of his *akari* (Japanese for light) lanterns, which he has been making since the early 1950s (p. 54).

sculpted in Italy in 1971 and measuring 46″ x 13″ x 22″. At right is an earlier and much-

noted work, *Gregory*, of bronze, in eight interlocking elements, 63″ x 16″ x 12″.

Wooden beam pierces *Stone of Spiritual Understanding*, created from aluminum and bronze, 1962.

Akari is a word that Noguchi says he "purloined." Its ideograph combines that of the sun and the moon. The lanterns that he has made under this insignia are indeed a fragile though not unimportant microcosm of the vast world of art that Noguchi has fashioned. They clearly relate to the interest in illumination that informs some of his best works dating back to the 1930s. Made to be carefully copied for sale at low prices, they demonstrate in a small way the same urge that the public playgrounds, plazas and gardens do in a big way.

Noguchi's sense of scale and space is perhaps unexcelled by any modern artist. Start with an *akari* lantern, about four feet high, in the curious, affecting shape of a square column twisted ever so slightly on a clear axis, bottom to top; jump to a gleaming stainless-steel pylon rising 120 feet in the air: the same form! The pylon, a marvel of engineering, a focal point of Noguchi's Civic Center Plaza in Detroit, fits its surroundings of sky and skyscrapers just as the lamp fits into a domestic interior.

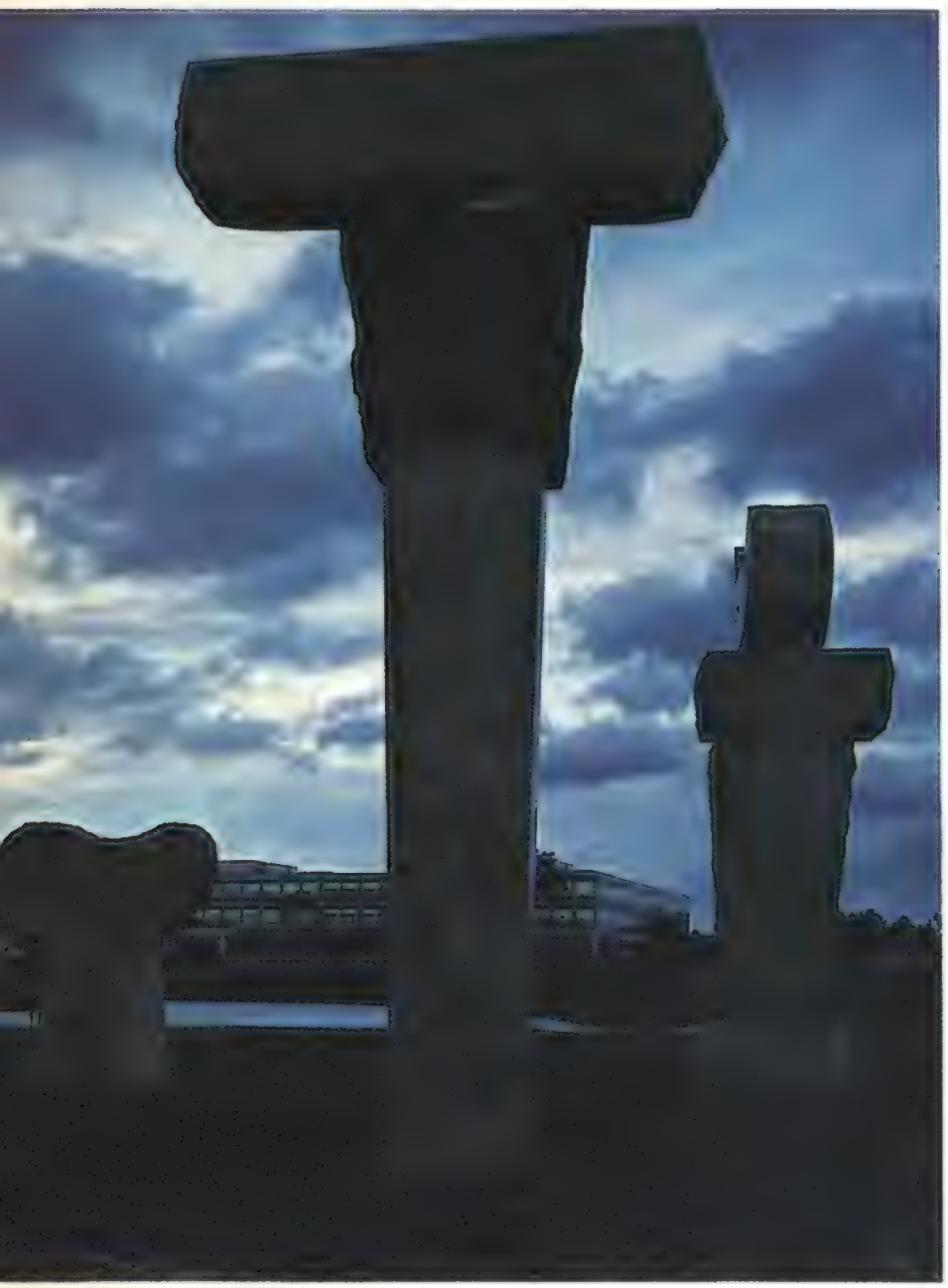
The Detroit plaza, with its pylon, its graceful terracing down to the river, its sensitively chosen textures, its pyramid that doubles as a seating platform and its fountain, is but the more recent and more spectacular of Noguchi's public spaces. The stainless-steel structure, officially the Horace E. Dodge and Son Memorial Fountain (cover), is a genuine technological and financial amazement, containing 35 different light-and-water configurations and costing nearly $3 million.

Noguchi actually began working on these spaces back in the 1930s, long before he was able to connect with the means to put his ideas into practice. By now, however, he has sufficiently demonstrated his remarkable ability to modulate large spaces with the fidelity, control and sure intuition with which he invariably handles stone.

Perhaps now, with this spring into the public sun, Noguchi will begin to get credit for being the great artist and key national resource that he is. Obviously, he's slipped and stumbled along the way, as is human. But his art has the force of tremendous energy and range and courage. His space consciousness from the 1930s onward has anticipated enormous changes in art. His public projects—studies in ambition, creativity and, often, frustration—opened the terrain for the terrific amount of activity going on in this country today.

Ironically, the playgrounds, in many ways the most straightforward of Noguchi's imaginings, are an almost separate story of frustration: he has built but two —one in Atlanta (pp. 46-47) and one in Japan—al-

In the studio, a lampland of standing and hanging lights, called *akari*, Japanese for illumination.



though he started dreaming of them and mapping them out nearly 45 years ago.

What the Walker Art Center is trying to stimulate with its show in Minneapolis is the process of seeing Noguchi whole (after the show closes there on June 18, it will travel to the Denver Art Museum, October 22-December 3; and then, in 1979, to the Cleveland Museum of Art, January 7-February 18; the Detroit Institute of Arts, April 10-June 10; and the San Francisco Museum of Modern Art, July 22-September 2). In the fall, a big book on Noguchi by Princeton art historian Sam Hunter should also contribute to this process—the first major work since Noguchi's own.

Noguchi at 73 still plays out the restless, driven, peripatetic pattern that has been his particular birthright. His studio in Long Island City, in addition to being the world's supreme Noguchi museum, is an office for planning, for "business," he says exhaustedly. "My solace has always been sculpture," he wrote ten years ago. It still is. He makes yearly trips to work near quarries in Italy and two or three trips a year to the island of Shikoku in Japan, where he lives and works with the master stonecutters.

Granite sculptures, tallest 16 feet, at Connecticut General Life Insurance Company, Bloomfield.

In front of Marine Midland Building, in heart of New York's downtown financial district, is *Red Cube*.

GRACE TRUST COMPANY

Using Dykstraflex camera, crew shoots *Galactica* perched on a pylon made invisible by blue wrapping.

Meticulous surface details, programmed camera movements, controlled lighting make ship seem huge.

By Leo Janos

Special science creates illusions in sci-fi spectacles

Effects wizard John Dykstra uses lasers, "smart" cameras, other modern technology to make his space fantasies seem real

Bearded, six-foot four-inch John Dykstra, who vaguely resembles actor Keith Carradine, is on his knees on a darkened sound stage, his broad shoulders hunched against a 35-mm movie camera as he peers through the lens, whistling to himself in concentration. "Hm," he says softly, "I think we'd better cut back on the lighting. We're getting too much contrast." His camera is focused on the model of a spaceship, which scintillates under the studio lights. The model is no larger than one of Dykstra's massive hands. "Dennis," he says to a colleague, "let's angle the ship a little more. I'd like to show more underside as it begins to make its strafing dive." The model, attached to a metal pole, is tipped at a slightly more dramatic angle. "Lovely," says John Dykstra with a grin. "Let the dogfight begin."

Dykstra is a 30-year-old motion picture special-effects genius who rocketed to instant fame on his brilliant work for the science-fiction film *Star Wars*. Today, hundreds of thousands of dollars are riding on his return to the depths of space as special-effects creator for *Galactica*, in many ways the most ambitious and, at some $7 million, perhaps the costliest film ever made

Although *Galactica* remains stationary, in the film the spaceship will appear to move at high speed.

for U.S. television. Planned for about seven hours when it is broadcast by ABC in May, *Galactica* is only the first symptom of what appears to be a sci-fi mania developing in the television and film industries as they try to capitalize on the success of *Star Wars* and *Close Encounters of the Third Kind.* In coming months NBC will feature a series based on the old Buck Rogers serials, while also producing a four-part treatment of Ray Bradbury's *The Martian Chronicles.* Paramount is producing movie versions of *Star Trek* and *Flash Gordon* to be shown in theaters. One outfit plans a meteor disaster and 20th Century-Fox is contemplating a film about an invasion from outer space. And, of course, a sequel to *Star Wars* is in the planning stage.

These films, like their predecessors, will rely heavily for their appeal on spectacular special effects. Thus, in planning *Galactica,* it was logical for ABC to turn to Industrial Light and Magic, the aptly named Van Nuys, California, firm Dykstra set up three years ago. For two of these years, he labored on *Star Wars.* And for the last six months, working out of a two-story warehouse converted into a workshop, Dykstra and his young crew (average age: 30) have been designing more than 45 miniature spaceship models and filming 300 separate special effects for *Galactica.* The filming techniques are unusually complex—matte painting, miniature photography, ultraslow and ultrafast frames per second, blue screens, front and rear projections, animation, beam-splitting mirrors, special optics, innovative processing, infrared film and traveling mattes (two or more separate pieces of film combined on a single frame). Most of this cinematographic sleight-of-hand was perfected during *Star Wars,* where the challenge was to achieve uncompromising perfection for giant theater screens that betray the slightest technical flaw.

By contrast, the small television screen conceals imperfection, but is a very limited instrument for conveying the speed, sound and large scale which are virtually mandatory in a sci-fi thriller. Nevertheless, Dykstra is preparing some of the most ambitious special effects

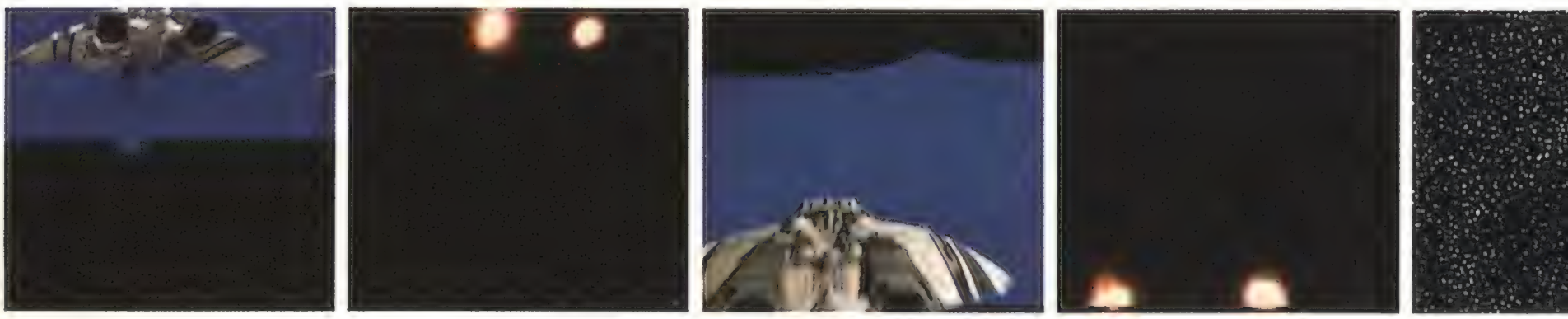
Leo Janos, a California free-lance writer, was once a Time *correspondent in Houston, where he reported on NASA and real space travel.*

ever devised: the viewer will see the three rings of Saturn, each spinning at a different speed; the cataclysmic explosion of a large planet; the destruction of an entire city (an intricate 100-yard model that will be blown to smithereens); blazing solar prominences; 50 or more spacecraft engaged in deadly laser dogfights; and a robot dog, as well as the rigs and costumes for weird antlike creatures with four arms. "These effects are hard to achieve because they're so easily made to look hokey," he says. "Especially blowing up a planet. That's got to take forever, building up that mass of energy and discharging it."

Through special effects improbable events are made sufficiently dramatic to force an audience to suspend disbelief. Indeed, for many caught up in such shocking films as *Jaws, Towering Inferno* or *Earthquake,* the boundaries between screen and reality have by no means always been self-evident. Sci-fi films like *Star Wars* or Stanley Kubrick's *2001* give special-effects coordinators a chance to indulge their private fantasies about the future in a cosmic setting, freed of the parochial constraints of everyday life. "It is a sheer joy making things that don't exist," explains Dykstra. "I can conceptualize without any consideration for such practical aspects as whether or not the hardware is manufacturable. In essence, I'm free to construct my own separate reality." But unlike most celluloid sorcerers, the ebullient Dykstra freely reveals all of the tricks of his trade. In fact, he enjoys explaining his illusions, perhaps because he knows even experts find them hard to duplicate. For example, in the July issue of *American Cinematographer,* Dykstra devoted some nine pages to an explanation of one relatively simple dogfight sequence in *Star Wars,* and although clearly written, the explanation would have made complete sense only to the top pros in the field. Veteran Hollywood cameramen have privately admitted that they don't understand how he gets his spectacular results.

Why this should be so cryptic an art is not obvious when you tour the Van Nuys facility and witness what seems to be a rather straightforward operation. At the heart of the current production is the mighty starship, *Galactica,* a bristling, alligator-shaped craft providing a last line of defense for mankind in its struggle against extinction by a horde of alien monsters.

Gliding slowly across your TV screen, *Galactica* will appear to be about 2,000 feet long. Actually, the leviathan measures 72 inches long and weighs 60 pounds, but the illusion of great size is produced by the meticulous detailing of her surfaces and the hundreds of portholes which glow convincingly from internal strings of optical fibers. For all its futuristic design, *Galactica* is built almost entirely from cannibalized model kits available at any hobby store. Dykstra's four young designers have repeated their original *Star Wars* joke by creating a seventh millennium starship out of the fragments of toy Panzer Kampfwagens, World War II battleships, trucks, vans and Kenworth tractors. A close look at the impressive grillwork surrounding *Galactica*'s two massive rear engines (made to dazzle the eye by four tiny quartz lamps) reveals nothing more impressive than treads from model Sherman tanks. The only truly sophisticated equipment aboard is an electronic circuit for operating sequences of lights



This sequence shows how a number of images are combined to make a single finished frame.

From left: one of *Galactica's* fighter ships; fighter's exhausts; second fighter; second

inside each of the giant pods which serve as bays for *Galactica's* fighter craft.

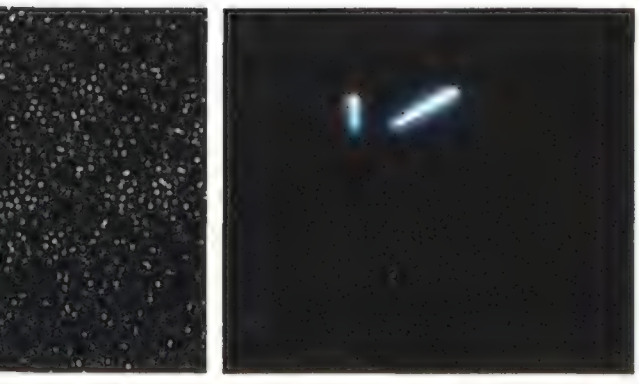
All these illusions begin in the studio's workshop, where a team of youthful draftsmen and gadgeteers worked ten weeks constructing *Galactica* out of items from "the pizza tray," a huge recycled film canister containing thousands of model fragments. The same technique was used to construct the home base of the bad guys, shaped like two large discs separated by a thick pillar. In all, 45 fighters and starships, some no larger than 11 inches, emerged from the shop. However, the most ingenious creation of all is a robot hound that Dykstra may use in the film. Designed to appear both endearing and canoid, it has no mechanical or electronic parts, but when asked who—or what—is inside, Dykstra simply smiles.

Filming of *Galactica* began in Dykstra's studio six months before the first actors were hired, and nearly half of the sequences were completed before the first rehearsals were held. This is a necessity considering that some frames incorporate as many as 12 individual images sandwiched to create one composite picture. The last step may be to film a live actor in the foreground. For example, one frame shows the following images: in the foreground, a man is running for his life. Behind him, to the right, a large supermodern building is engulfed in flames. High and to the left, a formation of space fighters swoops down, lasers blasting. The sky itself swirls with strange moons. Each element of this scene was filmed separately, and must match the whole in terms of perspective and light intensity to produce the effect of total realism.

Although this technique has been used in films for years, what is new is the degree of perfection now obtainable through electronics. "We are much more accurate today because of integrated circuits with memories and timers, and also the flexibility of digital electronics, as well as vastly improved lenses and optics," says Dykstra. His own contribution is perhaps the most sophisticated camera assembly in the world. Designed in 1975 as a collaborative effort between Dykstra and associates, the device has been nicknamed the 'Dykstraflex' (pp. 56-57). Basically, it is a motion-control camera plugged into a solid-state electronic device with a 12-channel memory. Each channel drives a different motor on a large boom capable of being positioned anywhere along a 40-foot track. The device can recall every movement for every shot taken, allowing for perfect repetition through seven axes of motion at very precise tolerances. It is outfitted with special lenses for high resolution and is capable of filming as slowly as one frame every 20 seconds (slower frames-per-second produce an illusion of higher speed on the screen).

Because of the camera's electronic memory, a series of matching shots of miniature spaceships can be filmed at different times, yet permit an exact repetition of pans, tilts, rolls, zooms and decelerations. This versatility is vital since the pint-sized models seldom budge an inch. It is the camera and a moving background or foreground that provide the sense of movement. The models must remain stationary in perfectly controlled light in order for the illusion of large scale to be sustained.

Although Dykstra's movie technology was perfected during the struggle to complete *Star Wars*, filming a space epic for television demands new strategies. "The fill-ratio of the screen has to be higher," says Dykstra. "On a small television screen, the ships must seem larger and move much more slowly in order to have impact. In *Star Wars* we would zoom a ship up and



ship's exhausts; star-filled background; laser beams from fighter's guns; enemy spacecraft.

Finally, seven frames become a composite to create the illusion of dogfight shown above.

At six feet four inches, cinemagician John Dykstra is taller than "enormous" *Galactica* is long.

away with breathless effect. On the tube the effect is lost. So we've done two things to compensate: most of our ships have wings, totally unnecessary in the airless void, but helpful on a small screen to impart a feeling of graceful flight. For example, if you constructed, say, a spheroidal starship, the audience couldn't easily tell in what direction it was moving, especially in the close-ups. So wings help to establish a frame of reference. Also, we're using vapor trails from engine exhausts. This helps to reinforce the illusion of speed, although it's a pure cheat since there are no contrails in space. We do this by inserting capsules of liquid nitrogen into the tails of the models. The effect is almost identical to jet vapor from a speeding plane."

Dykstra continues: "There's no room for subtlety on a small TV screen. For example, the backdrop of black sky and billions of twinkling stars: for *Star Wars* it was a masterpiece of subtle shades of brightness to create a three-dimensional effect. When we turned on our new star background for television, everyone in the shop laughed. It looks like a blazing white marquee, but on the tube it appears as a natural night sky."

One way to make an object look enormous on a movie screen is by employing sharply contrasted light and shadow, a technique that could be disastrous on television. "Our biggest headache," reports Dykstra, "is handling contrasts. Too much light leaves a streak across the screen. In between white and black, the range of gray values is compressed on TV, so it's very difficult trying to achieve contrast dynamics." Despite the limitations of the medium, Industrial Light and Magic's command from the network is to surpass even *Star Wars* as a spectacular. To do so, Dykstra and his crew have logged a lot of 16-hour workdays.

The heart of the operation is a big stage partitioned into three separate filming areas by funereal black curtains. On the largest stage sits the Dykstraflex camera and boom complex attached to 40 feet of metal tracks and surrounded by banks of lights and a six-foot-high electronics console with a tangle of plugs and wires. The camera faces a large movie screen. When backlit, an adjacent 20-foot panel of black felt with tens of thousands of tiny holes punched in it perfectly simulates the perpetual night of deep space with its complement of stars (p. 62). Behind one of the partitions is a smaller stage where a 12-foot krypton laser is beamed against a movie screen to reproduce solar flares arcing out from the surface of the sun.

Filming takes place simultaneously on all three stages, although the footage is usually unrelated. The blueprint follows some 200 pages of storyboard drawings worked out between Dykstra and writer-director Glen Larson. These graphics are a frame-by-frame representation of what will eventually be filmed. And as any visitor to the studio can attest, the work is tedious and exhausting, much more so than the live action scenes that are shot at the studios downtown.

On one typical day I watched the creation of the solar prominences. It took nearly six hours of preparation to film a 30-second sequence. The beam of the krypton laser was reflected off two mirrors onto a converging lens aimed at a large bronze bowling trophy, spraying a shimmering pattern of gold and red colors onto a large screen. When the bottom of the trophy was tapped slightly, the colors radiated outward in a striking facsimile of exploding hydrogen. Dick Edlund took a Polaroid photograph of the spectacle, shook his head and pronounced the results "good, but not great." On a nearby table were a dozen other prints, signifying

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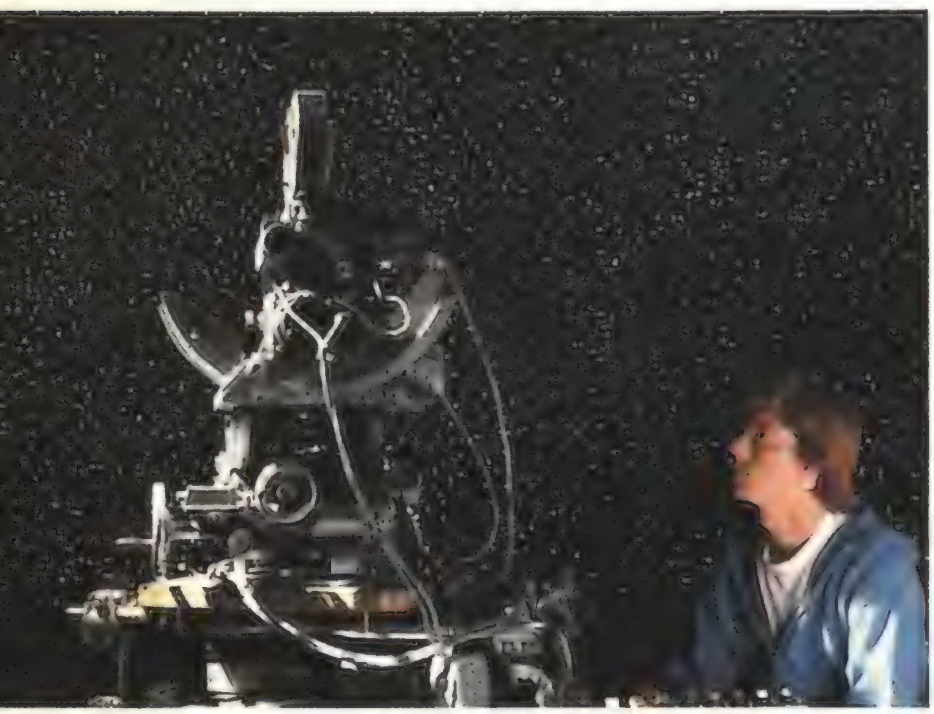
After experimenting, crew aimed laser through a piece of glass to simulate an immense solar flare.



An electronic camera will record Dykstra's "universe"—pinprick holes in backlit black velvet.

Strands of light-transmitting optical fibers will illuminate the portholes in the spaceship model.

the failure of experiments with a silver cocktail tray and a portable chrome fire extinguisher. Edlund took the Polaroid to confer with Dykstra and returned a few minutes later carrying a large bronze trophy his boss had won for his work on *Star Wars*. "John suggests that we try this," Edlund told the technicians. The improvement was striking as rich gold and blood-red patterns burned into the screen. "OK," said Edlund, "let's shoot it." An hour later, Dykstra's "Oscar" was back on a shelf near his desk sporting a deep laser cavity.

Meanwhile, the main stage is bathed in an eerie blue light from tinted fluorescent tubes backlighting the big movie screen. The model of *Galactica* is positioned in front, held in place by a supporting column wrapped in acrylic plastic and coated with a "blue screen" material. The film is insensitive to that particular shade of blue, and thus the column will be invisible. When filming begins, the camera will move from high overhead to a lateral position behind *Galactica*, simulating the dramatic, high-speed maneuvers of the pilot as he closes in for a landing.

The camera knows what to do

The camera will operate so slowly that this scene, lasting about 15 seconds on screen, will take about two minutes to photograph. The roll, pitch and yaw of the approaching craft had been carefully rehearsed the day before. The black-and-white trial film had been processed within minutes and studied frame by frame on a Movieola by Dykstra, who now suggests adding a final pitch effect, as the pilot attempts a last alignment before touchdown. Since the camera's electronic device already knows what to do, all cameraman Dennis Muren has to do this time is focus and hang on. *Galactica* is lit from the right by two kliegs simulating sunlight, but in the semidarkness of the stage, the boom's descending movements are barely perceptible. As the camera draws abreast of the landing pod, the boom decelerates, thus appearing to "brake" the space fighter for a smooth landing.

Although the pod measures four inches across and eight inches deep, its interior is fitted out with optical fiber landing lights and detailed miniature illustrations of men and equipment, and it appears to stretch into infinity (pp. 64-65). Another set, about the height of a large portable TV and four feet deep, presents a view from inside the landing deck as the fighter slows to a halt, but this sequence has already been shot.

A few feet away, the third stage is being used to film the background for the landing scene, which includes dozens of spaceships of every size and type, dominated, of course, by the gargantuan *Galactica*. Various drawings have been cut out and pasted on a large pane of glass and photographed against a blue screen. Later,

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The butler did it.

a star-twinkling sky will be added to complete the composition. Dykstra knows that the stars in space do not twinkle, of course—that's caused by thermal disturbances in the Earth's atmosphere. But lay audiences expect stars to jump and wiggle a bit and so they will, reality notwithstanding.

Despite the long, grueling hours, the atmosphere in the studio resembles a basement workshop where neighborhood kids gather to work on a project. To his employees, the gregarious Dykstra is more a buddy than a boss. In fact, most employees are personal friends whom he hired after observing their work and talent elsewhere.

Dykstra's apprenticeship was served under a fellow wizard, Doug Trumbull, who created the effects for *2001* and whose triumph in *Close Encounters* makes him a competitor for this year's Academy Award in visual effects. The son of a mechanical engineer who designs oilfield equipment, Dykstra studied industrial design at Long Beach State and became particularly interested in graphics and photography. After a spate of industrial films and TV commercials, he joined Trumbull's crew and became a cameraman-designer on a science-fiction film called *Silent Running*. "Every director wants his film to look unique in a way that's never been seen before," says Dykstra. "That means he wants special effects that have never been done before. And that automatically means conflict between the director and his special-effects people. Directors have a limited idea of how to achieve the effects they want, and rarely know whether they are even obtainable. All they know is that they want what they want, and they resent being told an effect is impossible or relying on someone else to achieve it." Numerous clashes over technical points with *Star Wars* director George Lucas were inevitable.

"There are a hundred different ways to do any special effect," Dykstra observes, "but the trick is to find the easiest route."

Finding the easiest route isn't always that easy—as in blowing up a planet, for example. His usual method for staging an explosion is to cover a 50-foot ceiling with black drapes and hang an explosive charge directly below them. He uses a magnesium compound that goes off like napalm and smaller, smokeless explosive devices to enlarge the fireball. The camera is aimed below the explosion to miss the rising smoke, and the explosion is photographed at a high rate of speed to slow down the effect on film. "That's the usual way I do an explosion," he said, scratching his beard,

Design and detailing provide depth in eight-inch landing bay for squadron of "warp-9" fighter escorts.

"but blowing up a planet is something else again."

Dykstra's ruminations were then interrupted by the arrival at his office door of two giggling stunt women dressed in the green, scaly costumes of four-armed antlike creatures, which in the film are called Ovions. Each one held a banana, a soft drink, playing cards and a cigar in her hands, and began moving each of the four arms simultaneously with the aid of prosthetic devices inside the suits. The demonstration looked convincing: an observer couldn't tell which pair of arms was real. Dykstra beamed and complimented them, then flew upstairs to the screening room to see the rushes of an aerial shootout with fiery beams of laser cannons painted in. Sitting with animator Harry Moreau in the darkened room, he suggested that a bit more red light be flashed off the wings of the dogfighters and then, speaking to no one in particular, exclaimed, "Is this a fun, crazy business, or isn't it?"

Close-up view of space carrier reveals surface made of model tanks. Fighter bay is at upper right.

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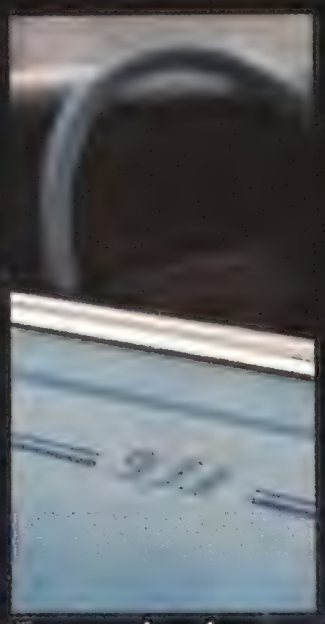

Personalized initials on door

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By Richard D. Altick

Snake was fake but Egyptian Hall wowed London

Cagey impresario William Bullock filled his museum with everything from Napoleon's bullet-proof carriage to Mexican loot

This article is adapted from The Shows of London *by Richard D. Altick, to be published next month by The Belknap Press of Harvard University Press.*

Centerpiece of Bullock's exhibition of ancient Mexican arts and artifacts was the plaster cast of

Of the many London showmen we meet by name in old records, few can be seen in sufficient detail for us to conceive the sort of persons they were. Among these obscure exhibitors, William Bullock has particular claims to remembrance. He was also a traveler and a naturalist of some reputation, as his election to such learned societies as the Linnean Society of London, the Wernerian Natural History Society at Edinburgh and the Royal Dublin Society attests.

Bullock began as a Liverpool jeweler-silversmith whose interest in natural history was stimulated by the opportunities he had to buy rare specimens from the captains and crews of arriving ships. In 1795 he opened a typically 18th-century—which is to say highly mixed—exhibition of natural and artificial curiosities. Some of the oddities on display were reputed to have been brought back from Captain James Cook's voyages.

In 1809 Bullock moved his collection (augmented by curiosities acquired from two other museums) to London, though retaining for a time the name "Liverpool Museum." Shortly thereafter, *Bell's Weekly Messenger* reported that the museum had "become the most fashionable place of amusement in London; more than 22,000 have already visited it during the month it has been opened." Among the visitors from out of town in April 1811 was Jane Austen, who reported to her sister Cassandra that she found "some amusement" at the museum, "tho' my preference for Men & Women, always inclines me to attend more to the company than the sight." If she had attended to the sight, she would have seen what an American visitor noted just a month later: among much else, a 35-foot-long boa constrictor "which makes the story of Laocoön quite probable," a 16-foot-high giraffe, "with a very pretty head like a horse, and mild innocent look, at the top of an immensely long, yet graceful, crane neck" and a bear which looked quite small in comparison.

By this time, the new home of Bullock's museum was under construction on the south side of Piccadilly. Its official name was to be the London Museum, but its architecture indicated the catch-all title it would at once acquire and retain for the rest of its long career: the Egyptian Hall. Egypt had been much in the English mind during the past 15 years as one of the early theaters of the war with the French and as the site of momentous archaeological discoveries.

The London Museum building was in a style most cautiously described as Egyptian eclectic (p. 71). It was

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the basalt Aztec "calendar." Fanciful serpent at left, with carved head placed in its mouth to simulate an Aztec deity, was a "compound" curiosity, not as nature made it but constructed partly of wood.

nominally inspired by the temple of Hathor at Dendera, a late Ptolemaic and Roman building which then was counted among the most impressive Egyptian monuments. The yellowish front was crowned by a huge cornice supported by sphinxes and two colossal nude statues in Coade stone representing Isis and Osiris. Alongside the door were stubby lotus columns; hieroglyphs bespeckled every lintel and jamb. What they said, if anything, was a mystery: the Rosetta stone, which broke the code of this ancient language, was not deciphered until 1822. To passersby it sufficed that the hieroglyphs *looked* Egyptian; and the building's purpose was adequately spelled out by the words LONDON MUSEUM carved beneath Isis and Osiris.

Heretofore, little attempt had been made to organize museum materials in any systematic, rational way, let alone to add a touch of showmanship. According to the journalist William Jerdan, his friend Bullock's collection was "admirably preserved and scientifically arranged." Bullock was the first English museumkeeper to arrange his specimens in a semblance of what are today called "habitat groups," with careful attention to the postures and physical surroundings.

The central display, called the "Pantherion" and housed in a wing west of the main block, was intended, as a contemporary description put it, "to display the whole of the known Quadrupeds, in a manner that will convey a more perfect idea of their haunts and modes of life." Entering through a mock-up of a basaltic cavern suggested by Fingal's Cave on the Isle of Staffa, visitors found themselves in a room fitted up to resemble a tropical rain forest, with an Indian hut prominent in the foreground, a painted panoramic scene in the background to supply the effect of distance, and "exact Models, both in figure and colour, of the rarest and most luxuriant Plants from every clime" to complete the illusion of place, though there was some doubt as to what the place was. The specimens, dominated by a giraffe, a rhinoceros and an elephant, were disposed to suggest their natural activ-

Richard D. Altick is Regent's Professor of English at Ohio State University. Preparation of The Shows of London *took him five years.*

At the height of his museum career, top-hatted William Bullock looked every inch the showman.

This 1810 acquatint shows "habitat" in Liverpool Museum in London before he built Egyptian Hall,

ities. The lion, panther and jaguar were in dens or on large property rocks; seals were ranged on rocks overlooking the panoramic "Sea-View"; anteaters hovered near the model of "one of the turrets, or nests of the Termites or White Ants of Africa"; a lemur crouched on the branch of a tree; three sloths clung to an American aloe, near the head of the rhinoceros.

In 1816 Bullock, perhaps finding that the museum alone was not rendering him enough profit, decided to diversify his exhibition. One room, named for the occasion "The Roman Gallery," was devoted to a collection of objects of art he had bought as a speculation: "Magnificent Decorations," as the "descriptive synopsis" had it, "consisting of Antique Marbles, Jasper, Agate, &c in Vases, Tablets, and Tazzas; and Superb Pictures of the Ancient and Modern Masters."

In another room Bullock exhibited the result of what might have been regarded as a desperate gamble but which turned out to be a lucky coup. The British fascination with Napoleon had already begun to have what would prove to be its strong and lengthy impact upon the exhibition business; for six months a huge portrait of the fallen emperor had been attracting crowds, at a shilling admission fee, to 97 Pall Mall.

In the same neighborhood there were at least two other displays of Napoleonic memorabilia: the Waterloo Exhibition, featuring the emperor's clothes, "superb dresses from the empress' apartment," and miscellaneous gleanings from the battlefield; and the Waterloo Rooms, where the star attraction was Napoleon's white barb charger, Marengo. This battle-scarred animal, announced the proprietor, "has five Wounds which are visible; and a Bullet still remains in his Tail. The Imperial Crown and the Letter N. are branded on his hind quarters. He is so gentle, that the most timid Lady may approach him without fear."

But if Pall Mall had Napoleon's horse, Piccadilly had Napoleon's carriage (p. 76), and the advantage to Bullock was enormous. On the evening after the Battle of Waterloo, the emperor's traveling carriage, which he had left following the battle in order to go ahead more swiftly on horseback, fell into the hands of

officially the London Museum, to hold an expanded natural history exhibit, plus Roman artifacts and

Napoleon memorabilia. Statues of deities Isis and Osiris flanked the entrance; sphinxes surmounted it.

the Prussians. The coachman, attacked by a company of lancers, had been severely wounded and left for dead. He survived, however, at the cost of an arm. The Prussian major who captured the vehicle passed it on to General Blücher, who in turn arranged to have it taken to England and presented to the Prince Regent. The prince, needing the money more than an extra carriage, sold it to Bullock for £2,500.

The carriage, a luxurious bullet-proof vehicle painted dark blue and gilt, with vermilion wheels, went on display at the Egyptian Hall along with the now-recovered coachman, two of the horses, Napoleon's folding camp bed, and the contents of his traveling case, "close on a hundred pieces . . . nearly all in solid gold, two leather bottles, one of rum and the other of fine old Málaga, a million francs-worth of diamonds and a cake of Windsor soap."

The show attracted more people—10,000 a day—than had any previous London exhibition. Then Bullock took the carriage on tour, with equally gratifying results. He wrote shortly afterward that the carriage and its contents "gave me the power of accomplishing, in a few months, what, with all his talents, riches, and armies, he [Napoleon] could never succeed in doing; for in that short period I over-ran England, Ireland, and Scotland, levying a willing contribution on upwards of 800,000 of his Majesty's subjects; for old and young, rich and poor, clergy and laity, all ages, sexes, and conditions, flocked to pay their poll-tax, and gratify their curiosity by an examination of the spoils of the [fallen] lion." From an investment of £2,500 Bullock won a return of £35,000.

Once Bullock had exhausted the potentialities of the battlefield carriage, he sold it to a coachmaker for £168. In 1843 it was purchased by Madame Tussaud and Sons, who installed it in a new display area initially billed as "The Shrine of Napoleon, or Golden Chamber." At the waxworks it remained, the most durable of all the Tussaud exhibits, for more than three-quarters of a century, until destroyed by fire.

By 1818 Bullock seems to have been forced to conclude that he had too much capital tied up in these

Giovanni Belzoni, onetime strongman, brought the museum a dazzling exhibit from Egypt.

various collections. He decided to sell all three of his properties, the original museum, the Roman Gallery of antiquities and pictures, and his Napoleon collection, at an auction conducted by himself.

The sale lasted 26 days and attracted hundreds of prospective buyers, including representatives of Continental museums as well as private collectors. The centerpiece of the Napoleon collection, "the original model of the Colossal Statue of Napoleon, twelve feet high, which was taken from the top of the Column of Peace in the Place Vendôme when the Allies entered Paris in 1814," was knocked down for £33 12s.

When the hammer fell for the last time, Bullock had made £9,974 13s. Some of the prices were disappointingly low because a number of the natural history specimens were in bad condition, and a few, to borrow the euphemism of the auction room, were "compound," that is, not as nature had made them. Among these was a boa constrictor—the same, no doubt, that Jane Austen had overlooked—composed of two serpent skins and a wooden head.

The Egyptian Hall's prestige remained high. An odd stroke of luck determined that it be occupied by, of all things, a sensational exhibition of Egyptian art and artifacts. The story behind this show was as romantic, in its way, as the exhibition itself. Giovanni Battista Belzoni was a native of Padua who wandered through England during the years of the Napoleonic Wars as a sideshow giant, strong man and conjuror; he finished as a national legend. "The once starving mountebank," a Victorian moralizer later wrote, "became one of the most illustrious men in Europe!—an encouraging example to those, who have not only stout heads to project, but stout hearts to execute."

Belzoni was magnificently proportioned, superhumanly strong and, said Sir Walter Scott, "the handsomest man (for a giant) I ever saw." At Sadler's Wells during his years as a performer this "Patagonian Sampson," as he was billed, donned an iron frame on which ten or a dozen members of the company would climb. Holding a flag in each hand, he would then walk about the stage, carrying this "huge human candelabrum" weighing about three-quarters of a ton.

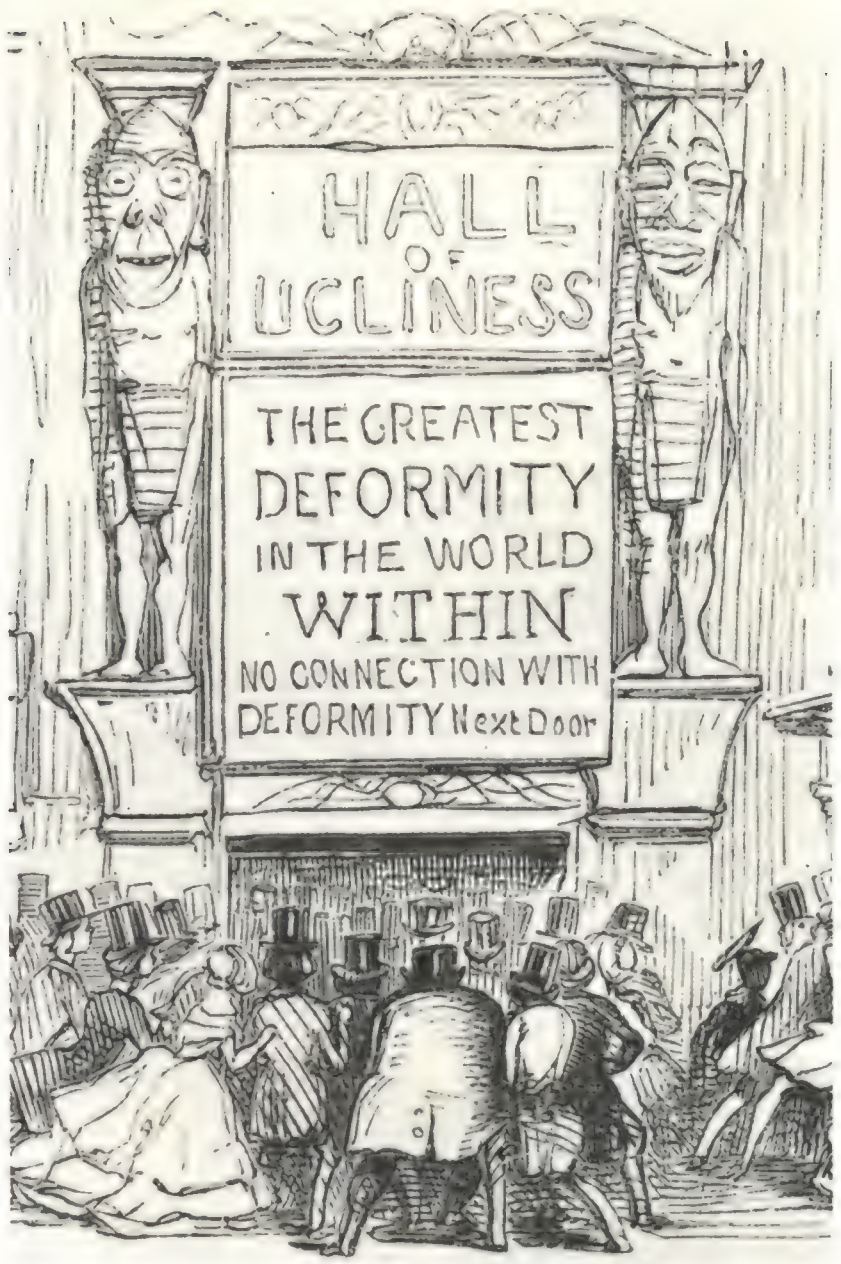
In 1816, once the war had ended, Belzoni successfully proposed to the British consul in Egypt that he be deputed to claim for England and bring down from Thebes the famous colossal head of Rameses II. From this initial scheme, the project broadened so far that in the next three years Belzoni was engaged in a series of intensive explorations and excavations which resulted in the excavation of the buried temple of Abu Simbel and the discovery of six royal tombs in the Valley of the Kings, the opening of the second pyramid, and in establishing the site of the lost city of Berenice—the most impressive accomplishment of any single Egyptologist up to that time.

A plethora of exotics

Belzoni brought his accumulated treasures to London in 1820. The perfect site for their display was already in existence in Piccadilly. Before the public opening on May 1, 1821, a private preview was held, the guest list having been supervised by Belzoni's publisher, John Murray, who had the power to invite the cream of society and the intelligentsia. They came, they spread the word, and the show at the Egyptian Hall was an immediate success. On the first day there were 1,900 visitors at half a crown each.

Belzoni doubtless had seen Bullock's imaginatively installed natural history display in these same rooms, and his own exhibition excelled it in brilliance. "Every eye, we think," said *The Times*, "must be gratified by this singular combination and skilful arrangement of objects so new and in themselves so striking." Centrally displayed, under the dome of the Great Room, was a pair of plaster of Paris replicas, made from Belzoni's wax impressions and colored after his drawings, of two of the finest chambers in the tomb of Seti I. One was of the so-called "Room of Beauties," 20 feet by 14, lined with "emblematical representations" of the pharaoh and his gods. Beyond this was a replica of a much larger room, eerily resplendent with representations of ibis-headed gods, snakes, demons without arms, mummies stretched on couches and a painted

It felt like Europe.
With a dash of Hemingway.
Old walls. Clouds making faces.
Breeze. Spring. Waiter looked like a
Toulouse-Lautrec poster.
Aperitifs (Smirnoff and red vermouth).
Let's come back.
SMIRNOFF ® VODKA 80
& 100 PROOF. DISTILLED
FROM GRAIN STE PIERRE
SMIRNOFF FLS (DIV. OF
HEUBLEIN)
HARTFORD, CONN
Smirnoff
leaves you breathless®



To cartoonist in 1847, long after Bullock had left museum, "the taste for the monstrous" reached a peak.

group centering on the god Osiris sitting on a throne. All in all, it was a dramatic exhibition which did much to spread interest in ancient Egypt and in archaeology at large among the general public.

Early in June 1822 the contents were sold at auction and the exhibition closed a few days later. Hungry for new adventure, Belzoni set out again in 1823, this time intending to reach the mysterious city of Timbuktu and explore the equally mysterious River Niger. But within the year he was dead of dysentery.

In December 1822, six months after Belzoni's show closed, Bullock was on his way to Mexico, a country then in turmoil following the overturn of Spanish rule. While Bullock was at sea, however, war had broken out between the incumbent Imperialists and the insurgent Republicans. Upon arriving at Veracruz, fearing that the lives of strangers like himself were in danger, Bullock obtained an interview with Santa Anna, the Republican general. Accepting Bullock's assurance that his mission was "solely to acquire scientific information," the soldier guaranteed his safety. Thus welcomed, Bullock spent the next six months traveling widely in the country. The high point of his stay came when the Mexican congress ceded to him a flooded silver mine, which he had repaired by pumps and machinery brought from the United States and from which he reputedly made a substantial fortune.

Bullock returned to Piccadilly in November 1823 with a rich haul of exhibits (pp. 68-69): a cast of the Aztec "calendar stone," original carvings, architectural models, codices—a broad sampling of the remains of an ancient and, as far as England was concerned, little-known civilization. To these were added material representing modern Mexico: life-size and miniature models of fruit and vegetables as well as actual specimens wherever possible, more than 200 species of birds, between two and three hundred specimens of fish, and sketches made by Bullock's son, who accompanied him.

Public interest having been stimulated in advance by the publication of his *Six Months' Residence and Travels in Mexico,* Bullock opened his show of "Ancient and Modern Mexico" in April 1824. The installation had the same technical finesse that had distinguished the natural history museum. Downstairs, on entering, one was confronted with a panoramic view of Mexico City and, in front of it, "in order to heighten the deception, and to bring the spectator actually amidst the scenes represented, a *fac simile* [sic] of a Mexican cottage and garden, with a tree, flowers, and fruit; they are exactly the size of their natural models, and bear an identity not to be mistaken." To live in the hut (during exhibition hours, anyway), Bullock had brought back with him a young Mexican Indian.

After disposing of the exhibition following its Egyptian Hall run (the ancient carvings went to the British Museum, to form the nucleus of its pre-Columbian col-

Haven't you promised yourself a Cadillac long enough?

Maybe you've told yourself that sooner or later you're going to own a new Cadillac.

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Here is a Cadillac that's right for the times—leading the way for others to follow.

Designed and engineered for the changing world you live in.

There are many reasons to make your Cadillac decision soon. Cadillac craftsmanship. The Cadillac name. Cadillac resale value. The confidence in knowing that Cadillac is America's most sought-after luxury car, by a wide margin . . . year-in and year-out.

As you turn to steal a second look, you know the time has come . . . time to keep that promise to yourself and see your Cadillac dealer.

Cadillac

lection), Bullock returned to Mexico for a time, perhaps to attend to his silver-mining interests, then headed back to England by way of the United States. During his stay in Cincinnati, Bullock was captivated by The Elms, a thousand-acre estate stocked with wild turkey, grouse, pheasant, quail, deer, bison and elk, which extended two and a half miles along the Ohio River. He bought it and conceived the idea of founding a model community there to be called Hygeia.

In 1828 Bullock returned to Cincinnati with his family to settle at The Elms and, he hoped, break ground for Hygeia. Shortly after his arrival he gave a dinner party for another newcomer to the region, Mrs. Frances Trollope, who may well have read his account of Cincinnati's prosperous present and limitless future, just before she left London. In her chronicle of her American misadventures, *Domestic Manners of the Americans*, she described what to her was the Bullocks' ambiguous situation:

"He and his amiable wife were devoting themselves to the embellishment of the house and grounds; and certainly there is more taste and art lavished on one of their beautiful saloons, than all Western America can shew elsewhere. It is impossible to help feeling that Mr. Bullock is rather out of his element in this remote spot, and the gems of art he has brought . . . shew as strangely there, as would a bower of roses in Siberia."

On one occasion the Bullocks took Mrs. Trollope to witness a camp meeting in the Indiana wilderness. More to her liking, no doubt, were the frequent balls and receptions at The Elms, where Henry Clay, De Witt Clinton and James K. Polk were guests.

Bullock had no luck with his Hygeia. In 1831 he sold Elmwood Hall and 710 acres of his estate for $21,000 and in 1836 returned to England. If the site of Bullock's grave is unknown, along with the inscription which would give at least the date of his death, he did leave a solid monument: the Egyptian Hall itself, which housed a variety of entertainments until the turn of the century.

As Cruikshank caricatured it, this was "A swarm of English bees hiving in the Imperial Carriage" of Napoleon (whose emblem was the bee). With live coachman, it was a big Egyptian Hall draw in 1816.

The Duke of Wellington inspects wax image of Napoleon at Tussaud's (where the carriage shown by Bullock wound up). From a painting by Sir William Hayter, commissioned by wax museum.

By Thomas E. Lovejoy

Royal water lilies: truly Amazonian

These improbable plants are dependent for reproduction on beetles that spend much of their existence inside the flowers

A young Indian fisherman proudly displays his catch in a patch of royal water lilies near Leticia on the

There is a tropical plant that blooms white one day and turns purple the next, heats up at night and imprisons its insect pollinators, but is most often remarked on for quite a different quality. That quality is size, a size so out of proportion with what we are accustomed to that it unsettles our perspective. The plant is the legendary giant water lily of the Amazon, and recently, where the cola-colored water of the Rio Negro meets the chocolate-pudding water of the Amazon near Manaus, I was privileged to see some myself.

Named for Queen Victoria very early in her reign, long before her girth was such that naming anything so large in her honor would have been tactless, *Victoria amazonica* has been known to science for more than a century and a half. For the greater part of that time it has been kept in greenhouses but, like so much in the Amazon, most of its natural history has been largely unknown. While one might have thought that a water lily with pads five feet or more in diameter would have been studied in the field, the complexity of its reproductive biology was revealed only in 1975 by the joint efforts of Ghillean Prance, research director of the New York Botanical Garden, and Jorge Arias, an entomologist at Brazil's National Amazon Research Institute in Manaus.

They knew from greenhouse work that when the flowers opened, their heavy fruity odor was accompanied by an elevated temperature, and suspected that this, in part, was produced by metabolic activity in the flower itself. The ability to generate heat is rather unusual in plants, being known mainly in water lilies and arum lilies, and recently observed in palms, as well as giving the skunk cabbage a bit more distinction than one would otherwise be likely to accord it. It seemed likely that the *Victoria* flowers' regular six-hour hot spells had significance yet undiscovered. Beyond this, little was known about the lilies' life cycle.

The lilies occur in shallow lakes formed along river margins when the "white water" rivers (a classification specific to the Amazon basin describing a river type which is heavily laden with nutrients and not particularly fast-moving) of the Amazon flood. In some locations the lilies manage to persist throughout the year,

upper Amazon in Brazil. The pads grow five feet wide and more; the flowers open fully only at night.

but in most the lilies temporarily die out when the water becomes too deep or too shallow. Generally speaking, a lake of the proper depth—1 to 15 feet—can be found at any time in the area, so there is likely to be a lily plant growing and flowering somewhere.

When a flower bud is ready to open, it appears above the water and opens about sunset, triggered by the falling light level. It can be stunning to look across a lake at dusk and see scores of flowers opening together as if in orchestral synchrony, all of them white and strongly perfumed (the odor has been described as reminiscent of a mixture of pineapple and butterscotch). The flowers begin to heat up, aiding in dissemination of the scent. In the middle of the night, partly owing to insulation and partly to metabolism, they may be nearly 20 degrees F warmer than the surrounding air.

After darkness falls, and often well into the night, the main pollinator, the large (one-inch) scarab beetle *Cyclocephala hardyi* arrives on the flowers. *Victoria* blossoms are large, and often a dozen or more beetles will visit a particular flower. They must push their way down past the anthers, the pollen-bearing structures, which are not yet ready to shed pollen. The beetles work their way into a cavity at the base of the flower where the gynoecium, the female receptacle, is ready

for whatever pollen the beetles have brought with them from elsewhere. In the latter part of the night the flower temperature drops, the fruity scent gradually disappears, the innermost petals turn pink and the flower closes, with the beetles trapped inside. There the beetles spend most of their hours, well provided for in terms of food by special starchy flower structures.

By the next afternoon, when the flowers begin to reopen, the petals have turned a dark reddish-purple. By evening it is possible for the beetles, now covered with a sticky floral secretion, to escape. They push out past the anthers, which shower them liberally with pollen, and fly off to find new gleaming white "first-night" flowers. The pollination process is complete, and the beetles are well fed for their trouble. (Each plant produces only one flower at a time, so no effort by the beetle is redundant.)

I cut open closed purple flowers and in each one found a beetle; in one the beetle had tried to burrow its way out, but while this apparently occurs frequently, it generally neither makes for successful escape nor damages the flowers' ability to set seed.

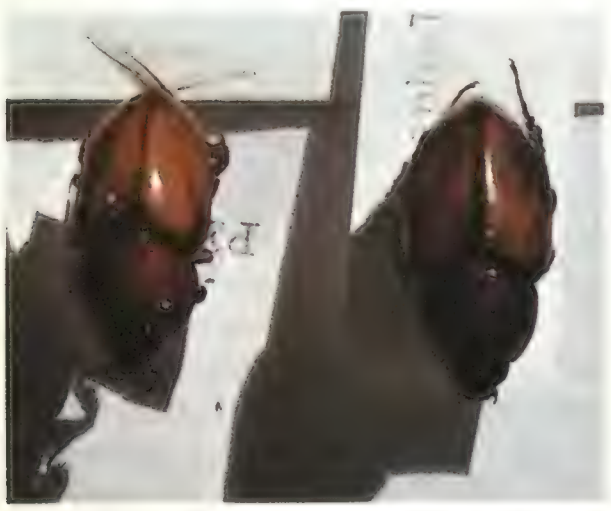
Prance and Arias reported they never saw the beetles on any other plant or eating any other food. They point out that because *Victoria* blooms all year (it is not a seasonal plant, but blooms when the water level is right), the beetles need never go elsewhere.

Obligatory pollinators and special flower structures to guide the insect and ensure pollination occur rather widely in plants, but entrapment of pollinators is not common. An arum lily of Europe has a system somewhat similar to that of *Victoria* in which the pollinating midge is trapped by bristles on stationary structures called spathes and held until released by the flower. In this case, heat generation seems to serve the purpose of destroying the tissue of the imprisoning spathes to permit escape and, in so doing, produces the impressive difference of 20 degrees F between the flower structure and air temperature.

By the third day the fertilized *Victoria* flower begins to sink to the lake bottom. There the seeds mature and develop a gelatinous tissue that eventually makes them float when what is left of the flower decomposes. The seeds rise to the surface, where they remain for about a day, dispersing over whatever distance they can drift in that time. Then the gelatinous mass washes away and the seeds sink to the bottom again.

Spines cover the buds and underside of pads, and my hands soon felt as if I had been spending a day tending a rose garden. A newly unfolding pad virtually bristles with spines, rather like some wrinkled rosy hedgehog floating about the lake. *Victoria* buds and pads probably would make good fodder for an aquatic grazer, and the most likely candidate against which all those

The author, who discussed vanishing species in the July 1976 SMITHSONIAN, *is program director for the World Wildlife Fund in Washington.*



Above are the scarab beetles essential to the lilies' reproduction. They are attracted by heavy scent and sight of all-white, newly opened flowers (center). The flower closes around them for a day (right) and

spines protect the plant is the manatee, a browsing aquatic mammal known as the sea cow (SMITHSONIAN, December 1974).

I would guess that, at least in the past, *Victoria* or its evolutionary predecessor was an important food for the manatee, perhaps especially because of the plant's sodium content. Sodium can be a limiting nutrient for herbivores, who get no salt (sodium chloride) from animal prey. On Isle Royale in Lake Superior the water lilies, which have a high sodium content, represent an important food source for moose and may play a role in moose population regulation.

Yale ecologist George Evelyn Hutchinson has suggested that in terrestrial plants grazing pressure for sodium is so great that these plants store their sodium largely in structures below the ground. And it would seem that ungulates, the major group of grazing mammals, might be chronically sodium deficient, which would explain why they are so frequently attracted to salt licks. Less pressure in aquatic ecosystems may have provided less cause for plants to evolve protective mechanisms, but at least in the case of *Victoria* the pressure to develop spines must have been there. Sodium levels and the accumulating ability of *Victoria* will be better known when Ursula Cowgill of the University of Pittsburgh completes a chemical analysis of pads, stems, flowers, water and mud collected by Prance.

Sodium might also be a clue as to why *Victoria* seems confined to white water and does not occur in the darker waters of the Rio Negro. There is an appreciably greater concentration of sodium in white water. Whether this is important for the lily, or whether other factors are the crucial ones, must remain unanswered for now, like so many questions about the Amazon.

Where *Victoria* occurs, it creates a special ecological community, spreading its pads across the water surface to trap most of the incoming sunlight available for photosynthesis. It does not, however, squeeze out all other aquatic plants; one that manages to coexist is the tiny floating water fern *Azolla*, which has important nitrogen-fixing properties useful in increasing yields from rice paddies.

It is as a structure that *Victoria* strongly influences the composition of the community. Heavy ribbing supports the pads from below; on top of the pad is a smooth green expanse of leaf, leathery to the touch, with a curl at the pad's edge to provide a couple of inches of rim. The rim is notched, probably to permit water runoff in heavy showers.

I found a number of beetles of species and families other than the pollinator on the pads, as well as a lizard. A shorebird watched from a safely distant pad as I worked, but the most abundant bird was the jacana or lily-trotter, which has incredibly long toes to provide better weight distribution. Occasionally one would fly up, briefly displaying its butter-yellow wings. The jacana's nest is often built on *Victoria* pads.

Perhaps most interesting of all the animals above water was a species of ant, tiny but numerous. They seem to make their nests where two pads touch together, providing a bit of temporary shelter. But the pads would seem to be at the mercy of the winds rippling along the surface, so any nesting site between leaves can only be ephemeral, requiring the ants constantly to be prepared to regroup.

I was more curious about what might live under the pads in and among the great cellulose ribs and girders. The stem attaching it to the bottom was too strong for me to flip the pad entirely over with an oar, so with the aid of a knife I cut sections of pad and brought them into the boat for examination. I found astonishingly little in the wafflelike pockets created by ribs and spines. There were two different dragonfly larvae, one large and one small, and a few round little brown aquatic beetles which often escaped my forceps. There were a small number of aquatic insect larvae

then, having turned purple (left), opens to release beetles dusted with pollen. Beetles are visible in flower pulled apart by researchers (center), as they are in flower cut to reveal cross section (right).

and a tiny leech. The underside of a *Victoria* pad may not be such a secure place after all, perhaps being vulnerable to gleaning by small fish.

Gerald Durrell once observed jacanas in Guyana making use of this little underside community as a food source. A mother jacana approached the torn edge of a *Victoria* leaf, grasped it in her beak and, setting her long-toed feet most firmly, pulled back the edge of the leaf so that her two young could snack on aquatic life.

Aside from the work of Prance and Arias and anecdotal reportage from travelers like Durrell and myself, little has been published in this country on the natural history of these spectacular plants. More has been published within Brazil, of course, and still more, much more, is known to the Indians who live where the lilies grow. (The Indians also have legends, in one of which the *Victoria* flower turns out to be the beautiful daughter of a chieftain who threw herself into the water and disappeared after seeing the reflection of her wandering lover, the moon.)

It is difficult to explain why there was so little interest in Europe and North America in studying this remarkable plant in its native habitat, especially when its discovery had such an impact on Europeans. The botanist Aimé Bonpland is said to have nearly thrown himself in the water trying to collect the lilies in 1820, and to have talked of little else for a month.

The first specimens reached the Museum of Natural History in Paris in 1828, but the real excitement came 20 years later with efforts to make the plant bloom in Europe. First attempts at Kew Gardens in London failed, and plants were distributed to other gardens. When Joseph Paxton, head gardener to the sixth Duke of Devonshire, produced a flower in a special tank at Chatsworth on the nights of November 8 and 9, 1849, the triumph was duly reported in the *Illustrated London News*. London's Crystal Palace, erected for the Great Exhibition of 1851, was designed after a new conservatory Paxton built for the lily and which repeated the patterns of ribs and struts on the undersides of the pads. The design proved so useful that it was widely adopted in England and this country in the following decades. The incredible plant from South America thus became celebrated not only for its oddity but as part of our architecture.

As I worked over the lily-pad fragments near Manaus, a dragonfly with a gleaming carmine abdomen hovered as if inspecting me, while another with green-and-black bands on its abdomen tarried for only a moment. Nearby a flycatcher perched on a reed and a snail kite preened on a dead snag. Perspiration trickled behind my ears as I bent forward in the hot sun. What fascinating pieces of biology, I wondered, remain to be found in the Amazon with one-fifth of the world's fresh river water and some 2,000 fish species of which only two-thirds have been described? The little flycatcher flew off with a flip of its wings, leaving me to ponder the world of the giant water lily.

The top, arched portion of London's Crystal Palace is reminiscent of the royal water lily pad, opposite.

This pad structure became a major influence on architectural design in the middle of the last century.

By Lawrence Richardson jr.

Life as it appeared when Vesuvius engulfed Pompeii

Comprehensive exhibition featuring objects and art from Rome's satellites, at the moment of destruction, comes to the United States

"POMPEII A.D. 79," a remarkable show of more than 300 exhibits from Pompeii, Herculaneum and Stabiae, the ancient Roman cities overwhelmed by a sudden eruption of Vesuvius, opens this month at Boston's Museum of Fine Arts. The objects have been carefully selected to evoke vividly the tenor of daily life in these south Italian cities at the moment of their destruction, and they range from carpenters' tools and ordinary storage jars to the jewelry and sculpture of the rich and powerful. In addition, there is an important selection of the decorations of the houses and temples, painted wall panels and mosaic pavements.

These treasures are for the most part on loan from the collections of the Museo Nazionale in Naples, and many of them are being shown for the first time outside Italy in this traveling exhibition (which has already visited London and Copenhagen), so it is an extraordinary opportunity for Americans to see what ancient life in Pompeii was like. The show will be seen in Boston from April 18 through July 16. It then goes to the Art Institute of Chicago, from August through November; Dallas Museum of Fine Arts, December through March 1979; and the American Museum of Natural History in New York, April through July. The tour is supported by grants from the National Endowment for the Humanities and the Xerox Corporation.

The abrupt arrest of life has always been able to awe us with the sense of life's fragility and beauty. The fossil silhouette of a fern on a sheet of rock can move one to wonder, while a spider imprisoned for untold centuries in a bead of amber seems a finer jewel than many a precious gem. Much the same aura surrounds Pompeii and Herculaneum, where a cataclysmic eruption of Mount Vesuvius, which everyone had thought extinct, brought life to an end with the bread still in the oven, the remains of a meal yet to be cleared, the watchdog still chained at his post.

Pompeii offers us our best illustration of how the Romans actually lived. All the minutiae of daily existence are there, and constitute an incredibly rich fund of information which illuminates obscure passages in the satires of Horace and Juvenal and the letters of Cicero and Seneca.

Even so, the Pompeii that excavation reveals to us is a city full of puzzles and problems as well as art and interest. Seventeen years before the final catastrophe, in February A.D. 62, Pompeii had suffered a particularly severe earthquake. We have no way of telling how many were killed, but the archaeological record of the rebuilding shows that scarcely a structure was left in usable condition.

The recovery from so terrible an earthquake is always slow, especially in a provincial town like Pompeii. Besides, only two years after the earthquake, the fire of Nero, the most dreadful fire in its history, de-

Section of show as it was installed in London's Royal Academy of Fine Arts (opposite) displays, on the walls, painted frieze in Villa of the Mysteries, a palatial Pompeian residence; and a replica of a household shrine with gods. Above, a large detail of painting, far left.

From the House of Colored Capitals, Dionysiac scene of formalized revelry, one of a pair of panels in

stroyed the heart of Rome. With the capital to rebuild, little of the work force that might otherwise have been called on would have been attracted to Pompeii until after the demand in Rome began to slack off, many years later. We therefore see in Pompeii a city that had been terribly crippled and still bore frightful scars, but the citizenry was determined to rebuild it in grander and more efficient form and had laid its plans and begun work accordingly.

So beside all the building in progress we see a great deal of makeshift repair here and there, the conversion of fine old houses into workshops and tenements, and the dislocation of the orderly patterns of urban life when some decisions have been made but much of the planning is still fluid. Pompeii was going through a period of enormous ferment and change, social and economic, cultural and artistic, when the eruption arrested it forever and, in so doing, preserved it for us to rediscover.

By A.D. 79 most houses had at least a suite of habitable rooms. A few, like the House of the Vettii and the House of the Tragic Poet, were completely new creations, or almost so, of the postearthquake period, where we can study whole house decorations at once, distinguish the uses of rooms and tell something about the place of the family in the society of Pompeii.

The House of the Menander, excavated in 1927-1932, is typical of most large Pompeian houses of the last period. It consists, first, of a large formal atrium complex, a covered court lit by a central opening in the roof around which were arranged the business, storage and sleeping rooms, and then a colonnaded peristyle around an ornamental garden onto which open the living and dining rooms, and off which open subsidiary complexes: the baths, the kitchens and a corridor leading to a wing of stables and slaves' quarters, with a little apartment for the overseer.

It was the house of solid citizens who were still oriented toward the farming of their land—fields presumably out in the rich valley of the Sarnus River south of Pompeii—people of an assured position in the community, people with education and a taste for literature, people of a conservative cast.

They seem also to have been a very religious family. Not only is there a large lararium in one corner of the atrium where everyone entering the house would see it, but there is also a handsome exedra off the peristyle dedicated to the worship of the family ancestors. The lararium is a typical house shrine, a diminutive templelike building to hold figurines of the gods especially venerated by the family and taken as patrons of the household, and figurines of the Lares, the gods of the area, be it house plot, neighborhood or city.

For the most part, though there is abundant evidence of rampant superstition among the Pompeians, there is not much evidence of genuine religious fervor. The phallus is displayed at points where there might be danger, at street corners and on ovens, to ward off evil influence, and many, perhaps most, shops and houses had a tutelary Priapus or a phallic amulet hung with bells at the entrance.

The only sign we see of true religious enthusiasm is in connection with the popular mystery religions. There are many proofs that the mysteries of the Egyptian gods, of the Magna Mater and Dionysus were very popular. But though Jewish names appear in

Professor of Latin at Duke University, the author has been researching Pompeii for 30 years and is now writing an architectural history of the city.

marble intarsia. A Thurberlike maenad dances with torch and tympanum, accompanied by a stylized satyr.

graffiti, and there is some allusion to Jewish traditions here and there, the possibility that there was a Christian community in Pompeii remains only a possibility. It was Isis worship that was clearly in the ascendant at the time of the eruption. Not only was the temple of Isis entirely rebuilt and lavishly decorated after the earthquake, but a wealth of dedications was discovered there, some of them of high artistic quality, and a great number of private houses have produced statuettes and pictures that show this cult to have been very widespread.

An emphasis on gardens and water was a phenomenon of the last period of the city. The earliest houses had no interior garden at all, and were purely formal arrangements of a ring of rooms around a central covered court (atrium) with a rectangular aperture in the middle of the ceiling so that light flooded down from above. The rain was caught in a basin underneath and channeled out to the street; later, they learned to store it in cisterns for use in the garden. To either side of the atrium were bedrooms and storerooms; across the back were the reception and dining rooms. Cooking was done in a shed somewhere out in the garden behind; somewhere else there was an earth closet. The house itself was a handsome, but hardly comfortable, architectural frame within which a gentleman presented himself to the public.

Later architects began to think of refinements and amenities and to include these in their planning. With the proliferation of seaside villas once Pompey the Great had cleared the sea of pirates in 66 B.C., people began to build with consideration of the view of the beautiful Bay of Naples and the mountains behind, and rich Romans appeared, who intended to use their houses only a few months each year at most. The Villa of the Mysteries is an example of the best domestic architecture of the middle of the second century B.C. The handsomely decorated rooms for the use of the owner are ranged across the southwest front, looking out through colonnades onto a strip of garden raised on an artificial terrace with a view of the bay beyond. The working parts of the house, the kitchen and baths, the winepress and fermentation court—all the operations necessary to a large agricultural estate—are

Heron, lizard, tough dog and some fanciful foliage are included in this garden painting from the House of the Epigrams, a good example of how stylishly Pompeians embellished their villas.

Youth (above) and fatherhood (opposite page) are two of a set of four theatrical masks, each one shown at top of steps leading up to a stage. Youth is framed by garland of flowers with Dionysiac

arranged behind these around a utilitarian peristyle and a court that lies between the villa and the road to town. In the master suite are dining rooms for every season, all beautifully painted with architectural vistas, but the big party rooms are those for summer and fall, when the owner would be most apt to be in residence, for this was a villa devoted to the production of wine. Now there also begin to appear women's dining rooms beside those for the men, decorated like them and communicating with them, but likely to be mistaken for bedrooms. Roman men, we know, usually reclined on couches at dinner, but it was considered very improper for a lady to do so. So the women ate in a dining room where they could sit decorously on settees; after the meal, they would join the men for the entertainment and drinking, perching on the edges of the dining couches with their feet on the floor. The great room of the life-size Dionysiac frieze (pp. 85, 93) is a men's dining room; a room with Dionysiac figures at half life-size next to it would be a ladies' dining room.

In the Augustan period we begin to see evidence of profound changes taking place in Pompeii. The important new houses are all villas, such as the villa of Agrippa Postumus, Augustus' grandson, at Boscotrecase near Pompeii, from which the Metropolitan Museum has obtained some magnificent landscapes. The so-called Villa of Cicero on the outskirts of Pompeii is another. These are elegantly decorated in the Third Style, in which great panels of flat color are relieved by delicate landscapes and miniature figures painted in bright clear colors. In the city itself Third-Style houses are a rarity, and almost always small houses with small rooms, but not infrequently an older house of large scale will have a room or two redecorated in the Third Style. After Augustus' death there was a marked diminution of vigor. Many young people seem to have left to seek their fortunes elsewhere, and with the development of the Bay of Naples as an imperial resort, where only those in favor at the imperial court would or could have villas, there was a sapping of civic life and interest in Pompeii.

But the earthquake proved that the city was far from moribund. If it was shattered by the catastrophe, that only made the survivors the more determined to repair and rebuild. The election posters painted along

connotations and crowned with a ribbon and wreath of ivy leaves. The white hair and beard were characteristic of role of an aged father. These wall paintings decorated House of Stags in Herculaneum.

the streets show that it still meant a lot to win election to a magistracy and a place in the senate of Pompeii. The inscriptions on storage jars and the range of their shapes show that the import and export business was thriving in the last days of the city. And the traditional products of the Pompeians, wine and oil, fish sauce (*garum*), and mills and olive-pitters of lava, seem all to have been produced in the last period.

The new Pompeii was to be spacious and salubrious with public buildings to meet every demand of business and leisure, with private houses that would be showplaces, with clubs and libraries and schools.

This high determination came to an end the morning of August 24, A.D. 79. The earthquake of 62 had been a forewarning of the reawakening of Vesuvius, which now erupted with terrible violence. We are fortunate in having Pliny the Younger's eyewitness account of this catastrophe, and certain of his details are made clearer by the excavations. At first, things did not seem desperate at Pompeii. At Herculaneum, on the other side of Vesuvius and closer to the crater, it was clear that a cataclysm was upon them. Torrential rain from the electrical storms generated by the heat from the volcano mixed with the dust of volcanic

The people of early southern Italy, so vividly portrayed here, could be Romans of today.

debris; it pelted down as mud, and more was sliding down the slope of Vesuvius, blocking streets and flooding houses. From Herculaneum they sent word to the imperial fleet based at Misenum across the bay asking for aid. According to Pliny's account, the ships found it impossible to land at Herculaneum, but by that time people in this sector must already have seen the urgency of the situation and fled. Only a handful of skeletons have been found in the Herculaneum excavations, and these seem to have been the sick and the old, those who could not or would not leave. The fleet went on to Stabiae, just beyond Pompeii at the beginning of the Sorrentine peninsula. There they found things very different, the danger not acute, but people preparing to evacuate should it become so. Pliny the Elder had a friend, Pomponianus, who had a villa at Stabiae; he dined and spent the night there. Ash and pumice were raining down and there were frequent earthquakes. Near daybreak, when the accumulation of volcanic material threatened to imprison them in the house, they tied pillows on their heads and went down to the shore. A sudden smell of sulfur drove others to flight; Pliny, who had been lying down, got to his feet but collapsed at once; he

Left, from Herculaneum or Stabiae, is portrait of woman displaying the most classic of Roman profiles.

Portrait of husband and wife, center, has man holding a scroll, his wife with stylus and tablet.

Above is mosaic portrait, thought to be from life, of a young woman of fashion, bedecked with jewels.

was old and asthmatic. There, when the light of day returned, two days later, they found his body whole, more like one asleep than dead.

Except for the elder Pliny, the group escaped, one gathers, and since Pompeii was close to Stabiae and the deposits of volcanic debris are very similar in the two places, we can presume the experience of the eruption was the same in the two places. At first there was a brief shower of pebbles of lava from the disintegration of the plug in the crater's throat, then a long rain of bits of pumice, varying from white at the beginning to gray and, finally, to greenish. Some 7.5 feet of pumice accumulated. Then there was a short rain of ash, a brief return of the rain of pumice, then a long rain of ash—some of it mixed with bits of carbonized wood, some with pebbles—that deposited 23 to 25 inches of matter on Pompeii. This rain of ash, loaded with lethal gas, must have been the decisive factor at Pompeii, as at Stabiae. Those who left before this managed to escape. Those who took refuge in cellars and those who stayed to pack perished.

Actually, considering the nature and suddenness of the disaster, the work of evacuation seems to have been very orderly at Pompeii. Pliny the Younger describes the confusion that beset the multitudes who sought escape by road from Misenum. Yet these seem never to have been in great danger and to have come through unscathed. In Pompeii it must have been immediately apparent that the principal route of escape would be by sea. A good number may have decided to flee up the valley of the Sarnus to Nuceria and through the pass to Salernum (Salerno); there was a good road, and it led away from the source of trouble. A surprising number of bodies was found at the Nucerian Gate. But Pompeii was a port city, and a busy one, used to handling all the cargo for Nola and the cities along the road behind Vesuvius, as well as for the Sarnus valley. Its port was a river port, and Strabo says traffic could flow in both directions along the Sarnus. The main gate leading to the port was the one we call the Stabian Gate; the Marine Gate with its steep incline would have handled little or none of the port traffic. Presumably the river was not very far from the Stabian Gate—in antiquity, probably not more than a few hundred meters. Just inside the gate, in the great square porticus adjacent to the theaters, they set up an evacuation center. This porticus was properly a practice ground and housing for gladiators, another of the regular exports of Pompeii. In one place or another in this building were found more than 60 skeletons, most of them in rooms close to the entrance; some were skeletons of children, and together with them were found also skeletons of dogs. So not all Pompeians left their dogs chained in gardens.

All these people were awaiting evacuation. They had been told to gather here, and that as boats could be brought in they would be taken out. But before the boats came the deadly ash had done its work.

The eruption was not quite the end of Pompeii, or of its agony. When the eruption was over, survivors returned to see what could be salvaged. The total accumulation of volcanic matter was only about 12 feet, and while roofs had caved in, recognizable parts of buildings still stood, poking up all over the site. It was not like Herculaneum, which was obliterated, buried under untold tons of mud that hardened rapidly to stone. In Pompeii the excavation of ash and pumice was a relatively easy process, and Emperor Titus appointed an imperial commission of high officials to supervise salvage operations and promised to give the property of those known to have perished to the relief of other victims. The forum of Pompeii was ransacked, perhaps by a contingent of the army, and not a single one of the 60-odd statue bases still standing there was found with its statue. For the most part, they took the marble revetment of the bases as well, so we do not even have the inscriptions that would identify those so honored for us. But the salvage work was dangerous; there were pockets of residual gas lurking for the unwary, and many died in the pits and tunnels they dug. So for the most part private citizens were content to rescue the contents of a strongbox or special treasures by means of a small well, and since rebuilding the city was out of the question, they then pulled up stakes, went elsewhere, and left its carcass, puzzling and complicated, for us to ponder.

Panel of the remarkable wall painting from Villa of the Mysteries in Pompeii richly depicts sacred text being read at bride's initiation.

Lolling on the beach of California's San Miguel Island, a female northern elephant seal looks content.

Article and photographs by Robert C. Gildart

Elephant seals —in herds again

Thought extinct at the turn of the century, these one- to four-ton pinnipeds with rubbery noses have made a fantastic comeback

The male of the species is adorned with a pendulous proboscis which, when distended, means trouble.

The modern world has lost many species of mammal to extinction. One that came perilously close to joining the list is the mildly grotesque creature on these pages, the northern elephant seal. Few creatures would have been easier to eradicate, and few creatures have the social structure necessary—a system in which every available female is impregnated at every opportunity—to enable them to return from such a low ebb.

Today, one place that serves as a production area for increasing the numbers of these seals is San Miguel, an uninhabited, once badly eroded, 14,000-acre island off the coast of California, used at times by the Navy for target practice. Devoid of all man-made structures save one removable hut that periodically quarters research biologists, San Miguel is the site of events that should cheer the naturalist. During the three-month-long winter breeding period, perhaps 10,000 elephant seals make their way to San Miguel's shores and, as in early times, conduct their affairs in their own inimitably rowdy and boisterous manner.

I first saw the seals from atop one of the island's steep cliffs. Here, on a fog-shrouded day, I stood with ranger Scott Wingo and biologist Robert DeLong and gazed down onto a broad sandy beach teeming with

thousands of the once-endangered seals. Through the mist, the pulsating masses seemed a scene from the Paleozoic era when life first ventured onto land. Later that day we would accompany two researchers, Rex Passion and David Larson, working for Dr. Burney J. LeBoeuf of the University of California, Santa Cruz, on a tagging expedition.

But now my attention was diverted by a large bull whose chest bore battle marks, some of which still dripped blood. The fights that produce such wounds are serious. Males may weigh from two to four tons, reach lengths of 16 to 18 feet, and have a girth of 12 feet. It is their oversized, drooping nose, however, not their size, that gives the species its name. Females are about a third smaller than the males and have "normal" snouts.

Precisely why male elephant seals have evolved such a bizarre nose is still a question. It contains inflatable air chambers which add volume to vocal threats. DeLong, a research biologist with the Marine Mammal Division of the National Marine Fisheries Service, postulates that the position of the nose may help males assess one another's intentions. Sudden muscular retraction of the nose, making it appear small, may signal "no contest." Conversely, an inflated proboscis is part of the visual threat display.

With the exception of the nose and the front and rear flippers, the general outline of the elephant seal resembles a bulbous torpedo, an ideal form for the life it leads in the water. With a powerful thrust of its hind flippers, it glides through the water easily overtaking its prey—sharks, squid and bottom fish.

On land, the elephant seal's body is somewhat of a handicap. Unable to bend their rear flippers forward as do sea lions, they lose mobility and are easy prey for human hunters. The elephant seal's blubber, which may measure seven inches thick, renders an oil considered superior to that of the sperm whale for lubricating machinery. A large male seal might yield up to 210 gallons of oil.

Because they had never confronted enemies on land, the seals were not alarmed when men arrived on their isolated breeding grounds during the early 1800s. Scientists today confirm that these animals lack flight reactions: teams are able to tag the animals, sit on them to restrain them physically and even obtain rectal temperatures. A crew of 35 sealers could kill and strip 120 seals in a day.

By the early 1880s, Dr. Charles Haskin Townsend, director of the New York Aquarium, wrote that he had cruised through all the animal's former haunts and

A Montana naturalist, free-lance writer and photographer, Mr. Gildart is completing a book on the mammals of Glacier National Park.

Two bulls try to outbellow each other. If that doesn't work, confrontation will become physical.

A victorious male mates with a female; he might have as many as 40 females in his individual harem.

had almost given up hope of finding any specimens when he located a herd of 16. These he shot and then had stuffed for museums. This action was justified on the grounds that the species was doomed to extinction anyway, and few specimens were in museums.

Scientific cruises continued through the turn of the century. Occasionally a scientist recorded sighting one or two animals or noted the bellowing of the seals from inaccessible sea caves, but it was not until 1911 that Townsend found a herd of about 125 animals on the island of Guadalupe, 150 miles off the coast of Baja California. A fertilizer company quickly suggested that it could "clean them up."

Such reactions prompted authorities in Washington to forbid the importation of skins unless accompanied by a written permit from Mexico. The Mexican government was more forceful. A garrison of soldiers was stationed on Guadalupe Island with orders to shoot anyone molesting the animals.

A foolproof breeding system

Today northern elephant seals have reestablished themselves on breeding grounds ranging from the Farallon Islands off San Francisco south to Cedros Island off Baja California. In 1972 they were removed from the endangered species list.

As elsewhere during the breeding season, males are first to arrive on San Miguel, doing so in early to mid-December. Here they remain for three months, fasting until the end of mating season, their preoccupation being to establish an order of dominance that will determine which ones will have access to the cows.

Females arrive toward the end of December. About seven days later, the females give birth to 70- to 100-pound pups. For the next few weeks, the pups will be nursed two to four times a day on milk that contains over 50 percent fat. While lactating, females do not feed and may lose more than 500 pounds. Just one month after birth the pup has almost tripled its weight, weighing as much as 300 pounds.

About the time a pup is weaned, females come into heat and fights break out anew among the males. Lifting their front quarters off the ground, these ponderous animals can become agile if not mobile. With their mouths open and heads thrown back, the bulls first bellow at each other. These sounds vary in pitch and frequency from individual to individual, and so can communicate identity and relationships. If no relationship is recognized, the animals move toward each other and a fight begins. Then like two boxers they bob and weave, feinting, with their mouths open, each seeking to inflict wounds on the other with its impressive canine teeth.

One vulnerable spot is the neck, and if several

slashes connect, the challenger is usually repulsed. Another vulnerable spot is the bull's long snout. If one bull manages to grab the other's nose, he will hold on until the opponent is able to rip free. Generally this ends the contest.

One bull will assert his dominance and exclude all other males from as large a group of females as he can hold—as many as 40. Once the group of females increases beyond 40, it becomes too large for him to move around. He has reached the limit of his mobility. Then a second male and possibly a third gain access to the female group. The second and third bulls also work to keep out potential suitors. And so it goes until several hundred females have joined the group, each of which is sought after by a correspondingly larger number of males.

Fighting determines which bulls mate each year. These bulls are usually the largest or most aggressive. Mature females seldom leave an island unfertilized, but, if they do, near the water's edge they face bulls that have arranged themselves into another male social hierarchy. Insemination may occur here, helping to further ensure perpetuation of the species.

The seals may be becoming their own worst enemy. Males oblivious to all else in their pursuit of females trample the young to death. Increasingly crowded conditions would impose an even greater loss among the young and, more significantly, limit the space available for breeding. As the elephant seal population of San Miguel and other Pacific islands continues to rise, the only thing these ponderous beasts have to fear is success itself.

Not dead bodies, but a peaceful triumph of biology.

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Bell System

By Robert Schadewald

He knew Earth is round, but his proof fell flat

A renowned English naturalist, seeking to convince a nonbeliever, won argument, lost the money

Alfred Russel Wallace (left) and John Hampden, who issued the challenge, prepare for Moment of Truth. When it came, each saw it in his own way.

On the morning of March 5, 1870, a small, grim-faced party, principals and seconds, met near the end of the Old Bedford Canal, 80 miles north of London. There was no possibility of reconciliation; gleaming instruments were removed from rosewood cases and the men proceeded to the task at hand. One of the principals was Alfred Russel Wallace, the brilliant naturalist who coincidentally with Darwin had arrived at the concept of evolution. The other was John Hampden. Their purpose was not to fight a duel, but to settle a £500 bet about the shape of the Earth. Hampden swore roundly that the Earth is flat; Wallace stated unequivocally that it is round. Each confidently expected to pluck a £500 pigeon.

John Hampden, the challenger, was born in 1819. His father was the rector of a small church and the author of a strange commentary on the prophecies of Daniel. John graduated from Oxford in 1839 with an interest in military affairs. He devised a grandiose scheme for fortifying the English coast, the "rampart of steel," and was incensed when the government ignored it. When new discoveries in geology and biology raised questions about some traditional interpretations of the Bible, Hampden rejected the findings of science. His absolute confidence in his own interpretation of the Bible led him into one of the great follies of the 19th century.

In 1869 John chanced upon the foundation work of flat-Earth theory, *Earth not a globe* by Samuel Birley Rowbotham. In it he found a persuasive refutation of Copernicus and Newton. The Bible says the Earth has foundations, and here was proof. The Earth isn't a ball, spinning giddily through space (according to Rowbotham), but is a flat, immovable plane, with the North Pole at the center and no South Pole. The sun is small, and circles above the Earth at a comfortably close 700 miles. When Joshua ordered the sun to stand still, it stopped dead until he let it move again. Eclipses, sunsets, ships apparently disappearing over the horizon—all the supposed proofs of the Earth's rotundity were explained away. There was instantaneous conversion at the first reading.

The excited Hampden rushed forth to reshape the world. He sought out the author of *Earth not a globe* and got permission to publish a pamphlet of extracts from it. He located some other flat-Earth pamphlets written by a printer named William Carpenter and bought up both

Illustrations by W. B. Park

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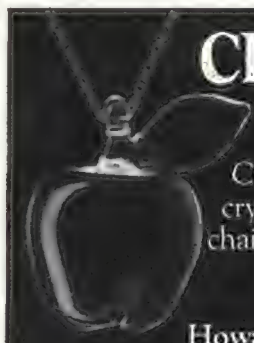

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Disdaining the telescope, Hampden was supremely confident that he had won.

the remaining stock and the copyright. Then, in a burst of zeal, he placed the following ad in the January 12, 1870, issue of *Scientific Opinion:*

> The undersigned is willing to deposit from £50. to £500., on reciprocal terms, and defies all the philosophers, divines, and scientific professors in the United Kingdom to prove the rotundity and revolution of the world from Scripture, from reason, or from fact. He will acknowledge that he has forfeited his deposit, if his opponent can exhibit, to the satisfaction of any intelligent referee, a convex railway, river, canal, or lake.
>
> John Hampden

Alfred Russel Wallace accepted the challenge. His studies of plants and animals had taken him to the Amazon and the East Indies. At 47 he was a renowned

Mr. Schadewald, a free-lance writer from Rogers, Minnesota, is preparing a book on the flat-Earth movement.

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naturalist, second only to Darwin in reputation. He championed many unpopular causes, and was something of a do-gooder. He saw Hampden's challenge as an opportunity to spike the flat-Earth nonsense and, just incidentally, make some money.

Arrangements for the experiment were made through a lengthy correspondence. The naive and idealistic Wallace assumed his opponent was rational and a gentleman, so he began losing points immediately. To spare Hampden public embarrassment, he suggested a simple private demonstration, but John, who did want to embarrass his opponent publicly, refused vehemently. The wily Hampden had read in *Earth not a globe* that Old Bedford Canal had been proved flat, so he recommended it to Wallace as a suitable place for the experiment. As stakeholder and referee, Wallace appointed a complete stranger, John Henry Walsh, editor of the weekly country gentleman's paper, *The Field*. And he generously allowed Hampden to appoint a second referee, one William Carpenter, printer and author!

"Simple and conclusive"

On Saturday morning, March 5, 1870, the parties to the experiment gathered in Downham Market, near the north end of Old Bedford Canal. One experiment had already proved unsatisfactory: on Wednesday, Wallace had attempted a demonstration with a line of markers six feet above the surface of the canal. Walsh was satisfied that the experiment showed the Earth's curvature, but Carpenter disagreed. Faced with meeting the deadline for Saturday's *Field*, Walsh had to return to London before the second experiment. Dr. Coulcher, a local surgeon, was appointed referee in his place.

Wallace now intended to educate Hampden with a simple and conclusive demonstration. The Old Bedford Canal ran straight and unobstructed for nearly six miles between Old Bedford Bridge and Welney Bridge. By placing a tall marker in the middle and banners on both bridges, all at the same height above the water, the Earth's curvature could easily be seen. Even allowing for atmospheric refraction, the center marker should appear about five feet above the line of sight from banner to banner.

The little party split up. Carpenter accompanied Wallace while he rigged the banners on the bridges, 13 feet 4 inches

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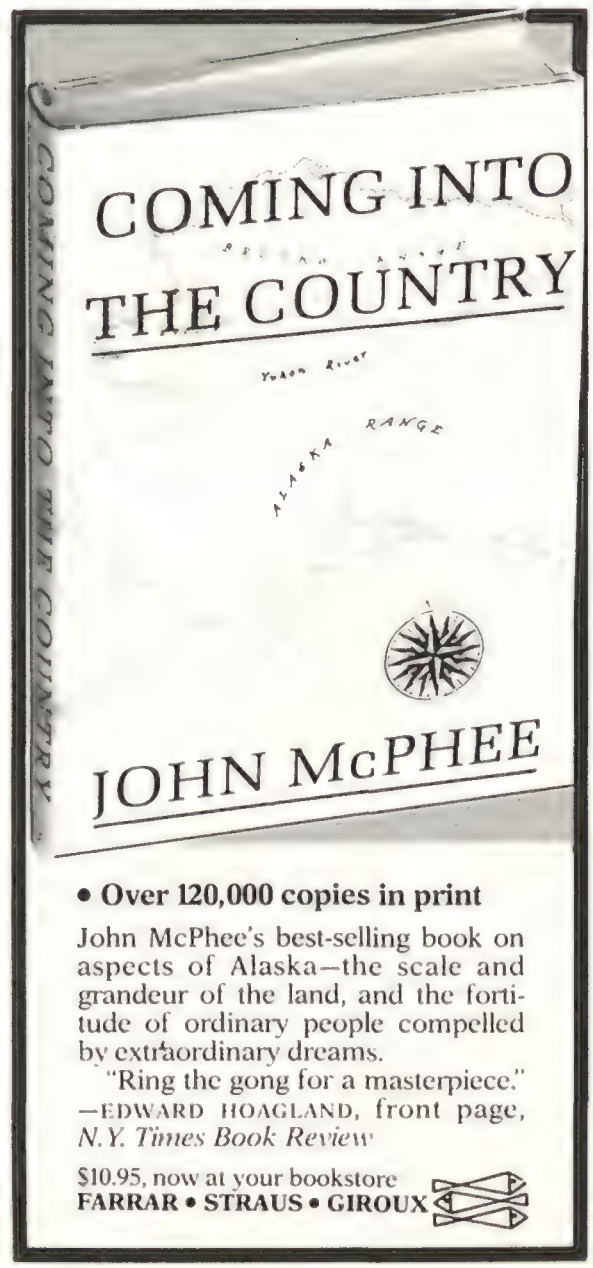

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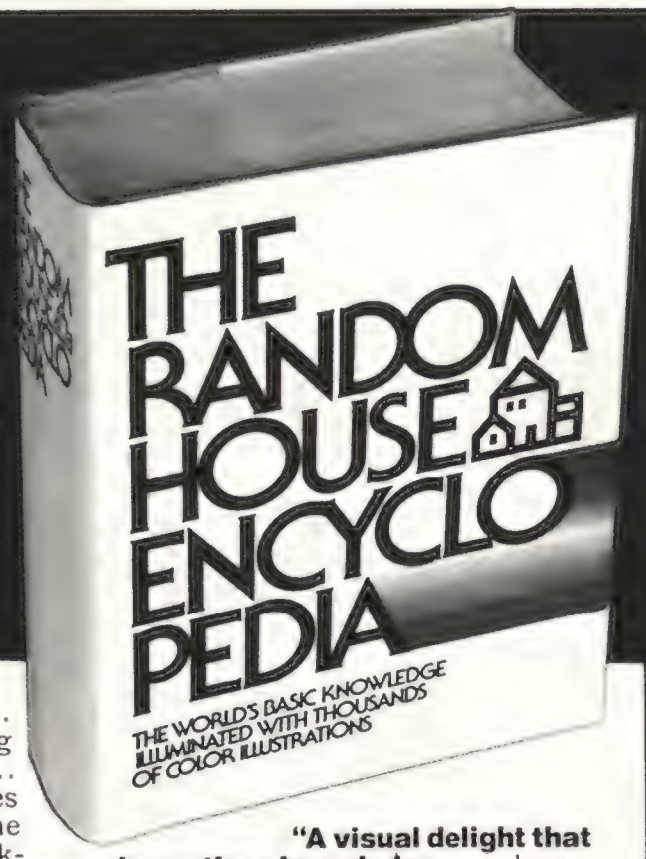

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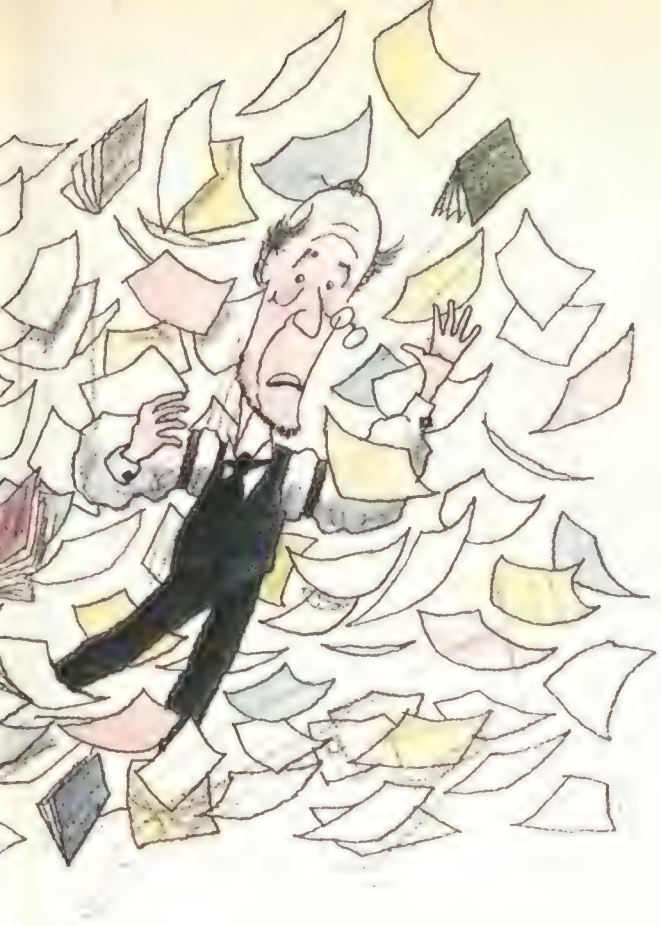
Hampden buried Wallace in a blizzard of pamphlets and letters to the above the water. They erected a pole in the canal midway between the bridges with a marker disc centered at the same height. It was nearly one o'clock by the time they joined Hampden and Dr. Coulcher on Welney Bridge, and there was a small crowd.

Wallace set up a large telescope so that its optical axis was exactly 13 feet 4 inches above the water and focused it on the distant bridge. The center disc showed well above the banner. Dr. Coulcher made a sketch of the view through the telescope, and Carpenter signed it as an accurate record of what he saw. But he claimed that it proved nothing, as the telescope could not be leveled.

They had brought along a surveyor's level, and Carpenter now fetched it from the carriage and helped Wallace set it up. Wallace carefully centered the leveling bubble and focused on the distant bridge. Carpenter looked through it and actually jumped for joy. The center marker was somewhat below the horizontal crosshair, and the banner at a similar interval below that. Most people would interpret that to mean that the Earth curves gently away from the observer, but Carpenter claimed that the equal intervals proved that level, marker and banner were all three in a straight line!

Wallace was flabbergasted. He had done precisely what he had set out to do, and had demonstrated the curvature of



editor. Wallace ignored them, though they are classics of denunciation.

the Earth in a simple manner. But Carpenter couldn't or wouldn't understand it, and Hampden wouldn't even look through the telescope.

While the naturalist alternately sputtered to himself or appealed to the crowd, Carpenter and Dr. Coulcher made sketches of what they saw in the surveyor's level. Then, mostly in silence, the little party drove back to Old Bedford Bridge and repeated the observations in the opposite direction. The result was the same as before.

That evening, at the Crown Hotel in Downham Market, Hampden accosted Wallace and demanded that he admit he had lost. Wallace's response was to maintain a dignified silence.

The referees, Carpenter and Dr. Coulcher, violently disagreed about the result, and the party dispersed in confusion. Hampden, supremely confident that he had won, wrote to Wallace a few days later and suggested that Walsh be called back, with authority to settle the matter. Wallace eagerly seconded the suggestion, and the editor of *The Field* found himself in the middle again.

John Henry Walsh was a gentleman with a high sense of honor. As a prominent and respected member of the British sporting set, he had held the stakes for many a wager. No doubt he conscientiously studied the sketches and written reports submitted to him by Carpenter

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Five times convicted of criminal libel, Hampden got off with apologies three times. But on the last two occasions he was sentenced to jail.

and Dr. Coulcher, although a glance at either set of sketches was sufficient. No doubt he tried to suppress the outrage he felt, having now learned that "unbiased" referee Carpenter was author of a flat-Earth book. He deliberated for two weeks, and in the March 26 issue of *The Field* he announced his decision in favor of Alfred Russel Wallace.

The furious Hampden demanded his money back, but Walsh delivered the stakes to Wallace anyway. Hampden responded to this "perfidy" with a blizzard of pamphlets and letters to the editor in which he suggested that Walsh and Wallace were less than honorable. If his reasoning powers were limited, his supply of venom was not, and his writings are classics of denunciation. But he was so filled with righteous anger that everything he wrote was libelous per se.

At first, Wallace grandly ignored him. Naturally, Hampden accepted his silence as an admission of guilt, and he bombarded Wallace's friends and colleagues with sulfurous letters and postcards. Wallace eventually grew tired of having words like knave, liar, thief, swindler, imposter, rogue and felon associated with his name, and in January of 1871 he sued Hampden for libel. The suit was not contested, and Wallace was awarded £600, a large judgment in those days. But while Wallace was in court, Hampden signed all his assets over to his son-in-law and declared bankruptcy. So Wallace ended up with a whopping bill for legal costs and a bit more education.

Shortly afterward, Walsh, who had also been decorated with the fallout of Hampden's rage, brought a criminal action for libel. The evidence was overwhelming, so Hampden pleaded guilty and apologized. He was ordered to keep the peace for a year, the British equivalent of being put on probation.

In June, Hampden sent the following letter to Mrs. Wallace:

> Madam—If your infernal thief of a husband is brought home some day on a hurdle, with every bone in his head smashed to a pulp, you will know the reason. Do you tell him from me he is a lying infernal thief, and as sure as his name is Wallace he never dies in his bed.
>
> You must be a miserable wretch to be obliged to live with a convicted

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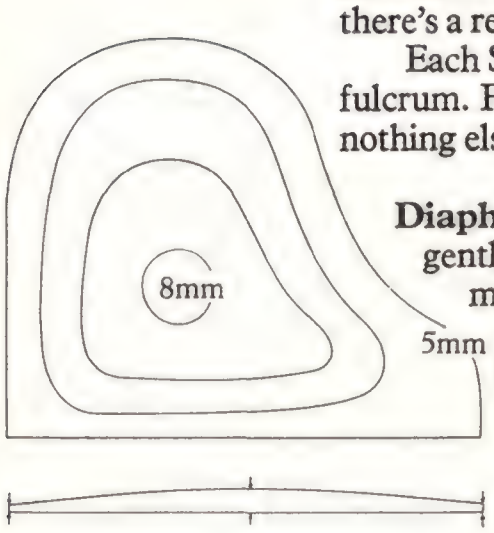

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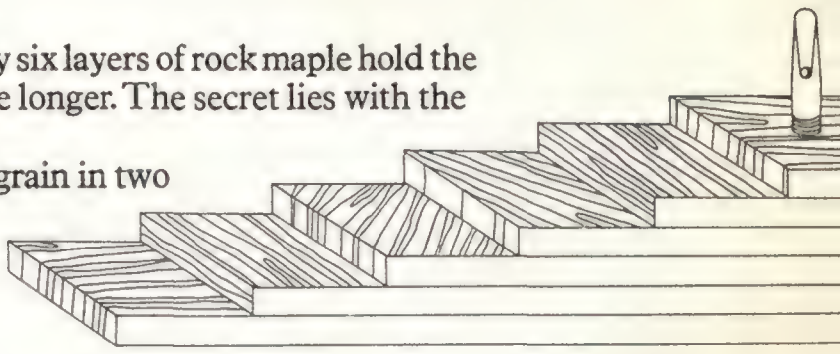

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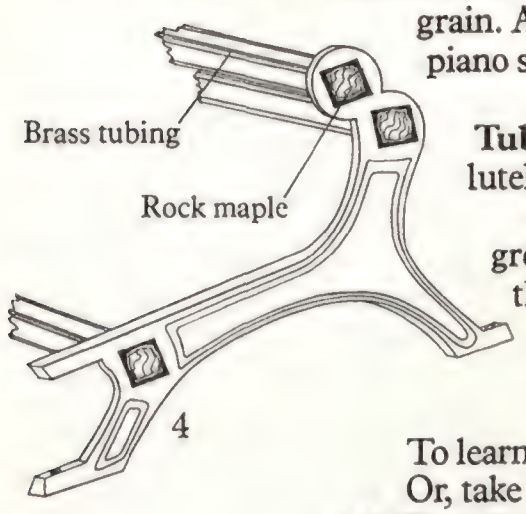

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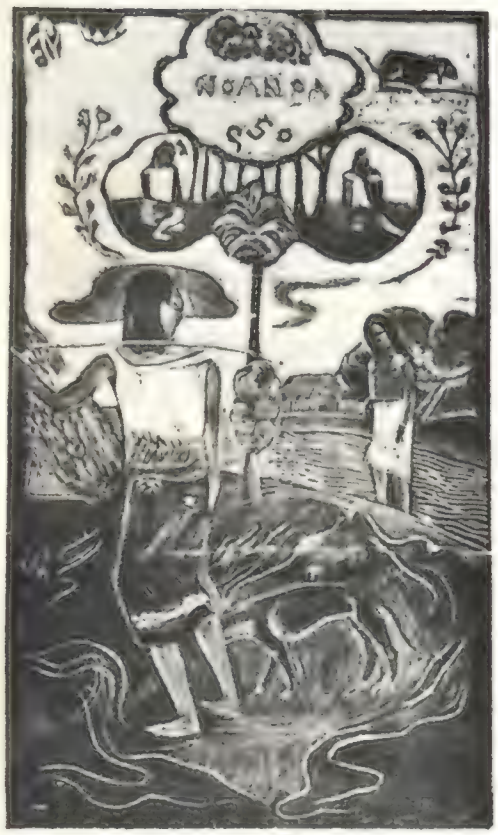

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As a spiritualist, Wallace had reason to dread Hampden even in death.

felon. Do not think or let him think I have done with him.

John Hampden

Needless to say, Hampden soon had an opportunity to explain this letter to a judge. He explained that some young friends of his were very much disturbed about the way Wallace had treated him, and that, fearing violence, he had tried to warn Wallace. The judge was skeptical and ordered John to put up £100 as surety that he would keep the peace for three months, and also to find two other sureties at £50 apiece. Hampden spent a week in jail before he was able to find the two additional sureties.

Criminal libel became a habit with Hampden, and in the next four years he was convicted three times. The first time he got off by apologizing to Wallace in several newspapers. The second time he was ordered to print another apology and to keep the peace, but the judge neglected to confiscate his ink bottle, and the never-peaceful John was soon sentenced to two months in Newgate prison. On the third occasion the disgusted judge sent him up for a year. He was released in six months.

Now Hampden turned the tables and sued Walsh, the stakeholder, for his £500. It was ethically questionable, but he had

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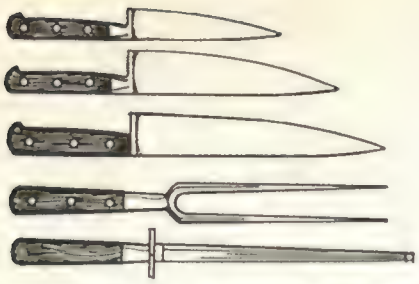

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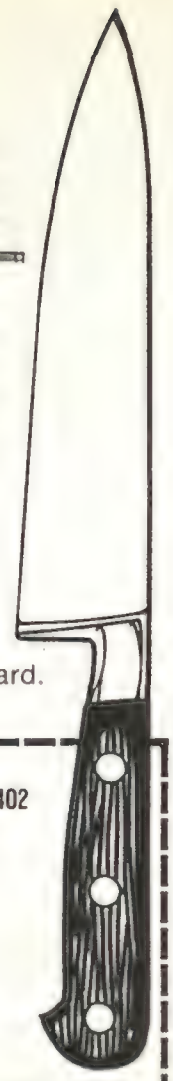

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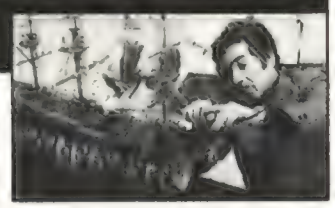

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an open-and-shut case: English law did not recognize wagers. That is, losers were not obligated to pay up but, once they had, they could not recover their money. The crux of the matter was that Hampden had demanded his money back *before* the stakes were delivered to Wallace. Legally, therefore, Walsh should have handed back the £500.

Naturally, Wallace bore Walsh's expenses in the suit. As Wallace still had a £600 claim against Hampden, and Hampden's bankruptcy was obviously (and perhaps provably) fraudulent, an accommodation was reached whereby Wallace paid the costs of the suit and retained a partial claim against Hampden. He never got a single penny.

For the rest of his life Hampden continued to plague Wallace but the naturalist resolutely ignored him. Unlike the single-minded Hampden, who never once doubted his own righteousness, Wallace came to view his part in the wager as an ethical lapse. And a costly one. He had envisioned a £500 profit but, years later, balancing legal expenses against monies received, he found the project considerably in the red. And except for his own education, the financial loss, embarrassment and persecution he had suffered were all for nought.

The flat-Earth movement thrived, for a while, on the controversy about the wager. Even today, despite the photographs

Two people who reject the notion that the Earth is round: Mr. and Mrs. Charles K. Johnson at home near Lancaster,

from space that show the Earth to be as round as a ball, there are still a few holdouts. There was a story from South Africa recently that a group of farmers in the Orange Free State had collected a sum of money and sent it to a university with the request that it "prove, once and for all, that the world is really flat." And Lancaster, California, is the headquarters of the International Flat Earth Research Society of America, whose president (below) claims about 1,500 members.

To believers in England Hampden became a hero, a David who had boldly attacked Goliath and been diddled out of his victory. Besides his other activities, he founded and edited three short-lived flat-Earth magazines and wrote many articles and pamphlets. In these, he vilified you-know-who, exposed the "errors" of Newton, unveiled his interpretation of the laws of nature, defended his military genius, denounced atmospheric pressure as an "absurdity" and announced the impending end of the world. It came for him on January 22, 1891.

Although Wallace had developed a perverse sort of affection for his old nemesis, he could have been forgiven for breathing a sigh of relief at Hampden's passing. He probably didn't. Wallace was an ardent spiritualist, and he must have shuddered at the thought of hearing Hampden's voice in the séance room, vilifying him across the Great Void.

California. He is the president of the International Flat Earth Research Society of America, she is its secretary.

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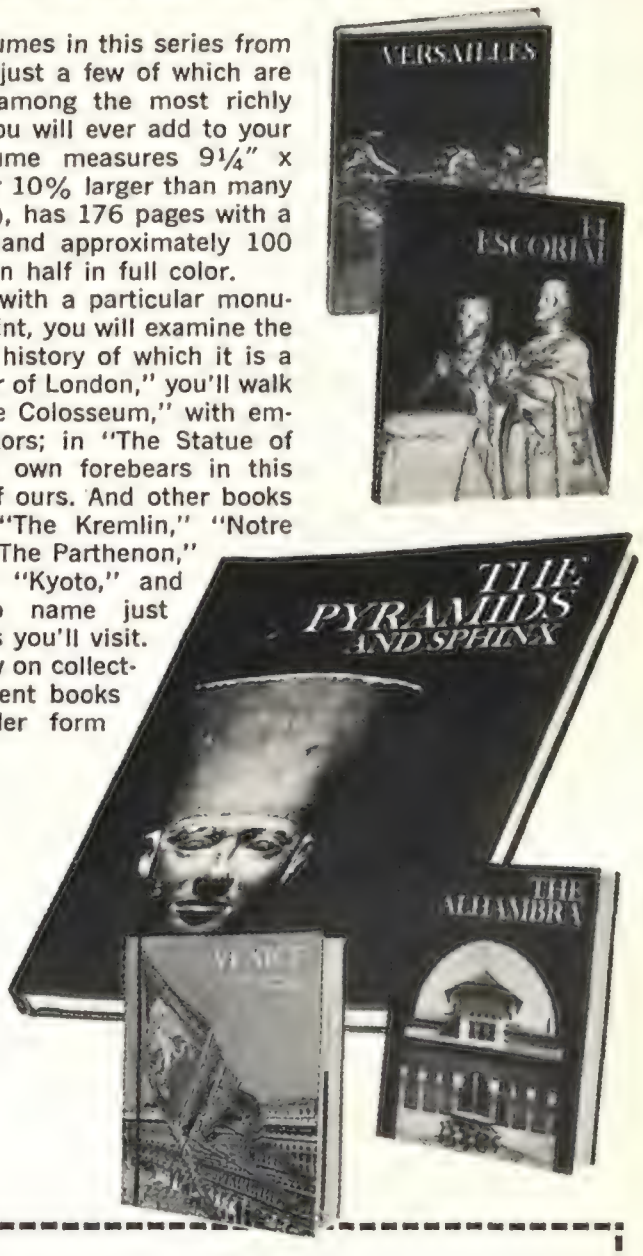

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Book reviews

George Lewis
A Jazzman from New Orleans
Tom Bethell
(University of California Press, $12.50)

Back in the dark ages of 1945, before the Rolling Stones or punk rock cast their wondrous enlightenment over fashionable musical taste, the trendies were being turned on by a 66-year-old pioneer of New Orleans jazz named Bunk Johnson, who had been resuscitated from obscure retirement in the rice fields and hot-sauce factories of Louisiana and brought to New York, accompanied by an equally unknown band. As jazz writer George Avakian said, "You couldn't show yourself at a chi-chi New York cocktail party unless you could discuss Bunk Johnson." The chi-chi set soon forgot him, of course, but the band's impact on traditional jazz was extraordinary; here and there around the world musicians imitate its archaeological style to this day. But Bunk died in 1949, and for the next 19 years, by which time the primitive, stomping sound of original early jazz had degenerated into a ritual performed for tourists at Preservation Hall, the music's leading figure was George Lewis, clarinet player in Johnson's band and the subject of Tom Bethell's story.

Japan, 1963: a bouquet for Lewis

Unfortunately, Mr. Bethell tells much of the story with the plodding monotony of a third-rate Dixieland rhythm section. But every so often an intriguing passage turns up (as if a Sid Catlett had taken over on drums for a few bars), and several chapters positively swing. These contain fascinating details of how Bunk, George Lewis and other custodians of the music then being played in New Orleans were recorded, largely through the efforts of jazz historian William Russell.

No teen-age pop prodigy of today, or no jazzman, for that matter, could conceive of such conditions, let alone produce classic music under them. George Lewis had a bit of brown paper wrapped around a loose tooth so he could play his instrument. (Bunk for years had no teeth at all, and no trumpet, either, until William Russell and his friends came to the rescue.) William Russell carried his $40 recording machine around the streets on foot. During one session, George Lewis' choice of a tune was overruled by a suggestion from a streetcar conductor. Another session a year later was recorded in George Lewis' bedroom; the clarinetist was recovering from two accidents on the docks where he worked unloading 260-pound coffee bales.

Still, the records exhumed the musicians from obscurity and carried their music to jazz fans who had never heard anything like it. Some listeners, indeed, were so swept away by its simplicity that they denounced far better New Orleans musicians such as Louis Armstrong, considered by jazz scholars to be practically the creator of the universe, as heretics, pollutors of musical purity.

"A lot of 'em were better mens than we were, at technic execution," George Lewis said of the musicians he heard in New York, "but there was something we would do that they couldn't do." He re-

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spected technique—he once reportedly confessed that Artie Shaw was his favorite clarinetist—but he believed in instinct: "When I play music, I like to have people around, especially people dancing, because then you don't think so much. It gives you a spirit because someone is patting his feet, you see, and it gets your mind off what you are doing. . . .

"The only thing is, I don't know how long this music is going to last." It was a prophetic remark. By the time George Lewis died in 1968, the authentic New Orleans sound was dead, too. Now, ten years later, jazz in its pure form seems to be following it to the embalmers.

—*David Lancashire*
The Globe and Mail, Toronto

Energy or Extinction?
The Case for Nuclear Energy
Fred Hoyle
(Heinemann Educational Books, $3.50)

Fred Hoyle is a scrapper. In his new book (and in just 76 pages), Hoyle takes on antinuclear environmentalists, the American nuclear industry, the fast breeder reactor and all of the solar and alternative energy advocates.

Despite popular opinion, the eminent British cosmologist unhesitatingly promotes nuclear energy as the choice of the future. Indeed, he feels that *only* nuclear power, as fossil fuel reserves dwindle, can satisfy the world's future demand for energy in a safe, economically reasonable and technically assured manner.

Nearly four years have passed since the oil embargo and still there is no national energy plan. This is not an indictment of our policy makers but, rather, a testimony to the complexity of the issues that surround the energy debate. We are faced with a lack of hard data on fuel supplies, slow progress in scientific research and the economic problems of alternative energy resources. Studies are published monthly that praise the benefits of one energy path or detail the disastrous consequences of another.

For these reasons, I was happy to see that Sir Fred, widely known for his unorthodox perspective, had focused his attention on energy planning. His case attacks the arguments against nuclear power without mincing words.

Hoyle confronts head-on the two major objections to nuclear power. The first is the fear that nuclear fuel will be diverted

from peaceful purposes to make nuclear weapons. Hoyle dismisses this possibility, saying: "Nothing concerning nuclear energy will prevent there being large stores of nuclear bombs in the world, for large stores exist already. It seems to me much more likely that these already-existing bombs will actually be used if the world runs desperately short of energy than if the world becomes energy-rich. So I would say that the development of nuclear energy is really a safeguard . . . against the outbreak of nuclear war."

The second major fear is that mankind's health will suffer from radioactive nuclear waste. Right now there is no long-term storage for high-level radioactive waste. This is a primary obstacle to an expanded nuclear program here and abroad. Hoyle recommends storage underground. He argues that "a typical nuclear power plant would produce about two cubic yards of waste per year. Yes indeed, a mere two cubic yards."

There would be little difficulty in burying this 3,000 feet deep in the earth. The radioactive intensity of the waste naturally falls off quickly. "A balance would be reached after about 50 years, a balance in which the rate of fall-off of the radioactivity of old waste became equal to the radioactivity of the new waste that was being added from year to year. Thus radioactivity would not increase indefinitely," but be "only a fraction of the heat produced by the natural radioactivity of the uranium and thorium contained in overlying rock."

Hoyle feels that use of an improved version of the CANDU nuclear reactor is feasible quickly and could eliminate the years of development a breeder program would need. The CANDU reactor is more efficient than the ones used now in the United States, he thinks.

Hoyle's arguments are persuasive, but not convincing; they are provocative, but not satisfying. They do not alleviate the feeling that there is no single simple answer to the world's energy problems—or that, as he maintains, "all of our problems of energy availability can be solved by very safe reactors of the CANDU type." I think that our quest for uranium could lead to major environmental dislocations. I am not sure the CANDU can be safely developed as quickly as he claims. I am intrigued but not convinced.

—Robert Gordon
Energy policy analyst

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The Riddle of the Sands
Erskine Childers
(David McKay, $12.50)

Carruthers is a young man of fashion spending a bleak September in late-Victorian London. He feels abused and lonely because his Foreign Office duties keep him at his desk when everyone is on vacation. Then he gets a letter from a man called Davies, whom he knew casually at Oxford, inviting him to come to the Baltic for some late-season yachting. As Carruther's enforced isolation is nearly over, he surprises himself by accepting, even though he finds Davies' assumption that he will do so irritating. Davies' shopping list is also irritating: a shotgun, a stove and a special mixture of pipe tobacco being among the items.

So begins the most famous seagoing spy story ever written, now reissued in a new edition. As the oddly matched pair cruise the Baltic fjords in *Dulcibella* (sturdy and serviceable, but not quite the gleaming craft Carruthers had imagined), the reason why he has been summoned slowly emerges: while exploring the remote Frisian Islands, Davies has stumbled on some German naval activity that has left him very puzzled indeed. With the German-speaking Carruthers' help, he must go back.

Childers' only novel was published in 1903, and was an instant success. Over and above the beautifully cadenced suspense and the superb descriptions of sea and sand and tide, it held a sharp warning of a possible German amphibious buildup in the Frisians—a warning that their Lordships of Admiralty took so seriously that they moved part of the Grand Fleet from Scapa Flow in the Orkneys to Rosyth on Scotland's Firth of Forth for closer surveillance.

The approach of World War I gave *Riddle of the Sands* an added immediacy. That it had been banned in Imperial Germany increased its fascination.

By 1939, with Britain again in hazard from the sea, the book had come to be a harbinger of wars. American editions in 1915 and 1940 contributed to this role.

To those who love the sea, the appeal of Childers' story has been lasting. You will find it aboard many a yacht, usually between cruising guides and cookbooks on the narrow shelf reserved for reading material. *Riddle* aficionados debate the fine points of *Dulcibella's* weatherliness

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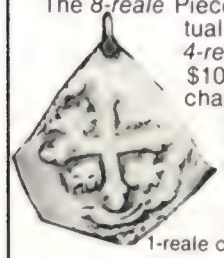
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or the professional skills of Davies and Carruthers in their muffled and midnight passage by dinghy to the enemy's lair, just as the Baker Street Irregulars discuss Holmes and Dr. Watson.

From his years of cruising, Childers knew the North Sea and the Baltic, late season and early. His narrative rings as clear as a ship's clock telling the hours, and his sea lore is flawless.

Before his gallant service as a World War I Royal Navy officer, Childers had passionately espoused the cause of Ireland's freedom. After the war, he broke completely with his Anglo-Irish inheritance to become one of De Valera's top lieutenants. Like De Valera, he embraced the outlawed Irish Republic. Captured by Free State forces during the bitter civil war that followed, he was tried by a military court and condemned to death. In November of 1922 he faced a Dublin firing squad with courage and composure.

Old readers and new of *The Riddle* will keep his memory green.

—*Burke Wilkinson*
Author of *The Zeal of the Convert*, a biography of Erskine Childers

Auguste Edouart's Silhouettes of Eminent Americans, 1839-1844
Andrew Oliver
(University Press of Virginia for the National Portrait Gallery, $22.50)

Interest in profile likenesses cut out of paper dates from the beginning of the 18th century. Profile snipping was regarded then as a parlor pastime—a craft to amuse unskilled, untrained amateurs, who needed only a steady hand and a good pair of scissors to produce fair portraits (known in England as "shades") from tracings of candlelight shadows.

Sneered at by sophisticates as shadow without substance, the spare black paper portraits were ridiculed in France as *silhouettes,* after Etienne de Silhouette, Louis XV's finance minister and an avid practitioner of the craft, who raised the hackles of the aristocracy by proposing an austerity program that would have cut the pensions allotted to noble courtiers. He was dismissed from office, but the much-derided silhouette grew in popularity, owing to the notoriety accorded the "science" of phrenology and to the greater influence of neoclassicism, which reacquainted European taste with the beauty of black-figured Greek vases. For

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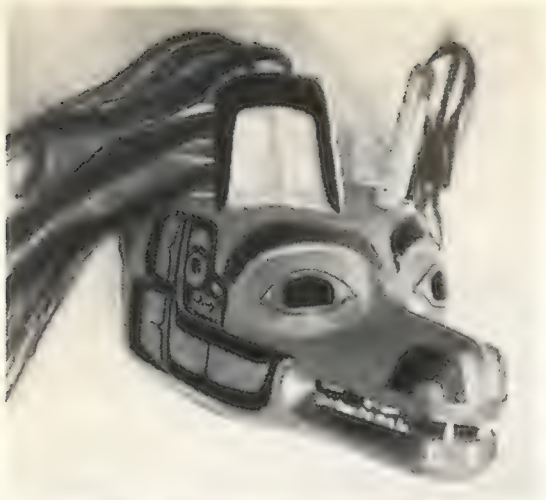

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Goethe, silhouettes linked "two irrevocably sundered ages." Exploited commercially, they were snapshots of the time, quickly executed and inexpensive, and they remained the most common form of portraiture until the mid-19th century.

The question is raised whether the silhouette is indeed an enduring art form. Andrew Oliver, compiler and annotator of *Edouart's Silhouettes,* believes that it is—and the visual proofs that he offers are compelling. He brings together in this handsome volume 348 silhouettes cut by the French-born Edouart and now on permanent loan to the National Portrait Gallery. Reproduced in their original size —about 11 by 8 inches—they represent the contents of what may be one of 16 albums saved from a shipwreck in which the rest of Edouart's 50-odd volumes were lost. They are the only collection of his 4,000 American silhouettes still intact.

Writing the biographies that accompany the silhouettes was obviously a labor of love for Oliver, who is a commissioner of the National Portrait Gallery. Many of his subjects are famous, including four Presidents—John Quincy Adams, Van Buren, Harrison and Tyler—and great luminaries of the legislative branch—Webster, Calhoun and Clay—but some might have been forgotten had not Edouart done their silhouettes.

Edouart was a jack of all crafts. As a young man, he had been the manager of a china factory in the south of France. Drawn into military service during the Napoleonic wars, he developed into a resourceful quartermaster, who, rather than transfer his allegiance to the restored Bourbons in 1815, settled in England, where he supported himself doing "Mosaic Hair Work"—that is, making pictures and portraits from feathers and human hair. Edouart took up cutting silhouettes on a dare. In nine years he is said to have scissored more than 50,000 profiles at a fee of five shillings—if accurate, an incredible feat of salesmanship as much as craftsmanship. Perhaps Edouart had exhausted the English market for portraits when, in 1839, he sailed for America. For six years he traveled a circuit encompassing Boston, New York, Philadelphia, Baltimore, Washington and points south. He summered each year at Saratoga, where he found many wealthy customers.

The one-dimensional detail that Edouart achieved with his scissors is astounding—spectacles, eyelashes, collars, hair

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locks. The camera could hardly do more. Laura Bridgman, the Helen Keller of her day, was a subject as was Joseph Henry, first Secretary of the Smithsonian.

Studying these silhouettes, one realizes how distracting and misleading a momentary facial expression can be in a portrait. Body language is more revealing. There were few stooped shoulders in the 1840s, and a distinguished naval officer can carry even his paunch with pride.

Despite its potential for detail, the silhouette shows a figure that is incomplete and, therefore, more human than one in a more sophisticated portrait. There is a wistfulness in Oliver's short biographies of Edouart's subjects that conveys a sense of this incompleteness. These eminent Americans seem less intimidating than our own.

Edouart's silhouettes, in a selection on exhibit at the National Portrait Gallery, somehow seem more remote when hung on a wall, deprived of the life in words given them by Andrew Oliver.

—Robert Rinehart
Historian at American University

Edouart scissored Henry Clay in 1841.

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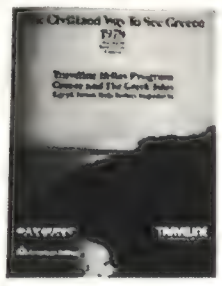

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"Composite Optical and Photographic Effects for *Star Wars*" by Robert

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By WILLIAM COLBY. Here at last, and for the first time, is the inside story of American intelligence and espionage, told by one of the most controversial of CIA directors. His autobiography makes for fascinating reading, as a personal and historical document of the times. $10.95

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17. **MORTAL FRIENDS**
By JAMES CARROLL. Spanning the bloodstained Irish Rebellion of the early 1920s to the tumultuous Boston of Curley and the Kennedys, this storytelling achievement is on the grand scale and richness of *Trinity* and *Centennial*. $10.95

18. **THE ADVENTURES OF MICKEY MOUSE**
By WALT DISNEY. In honor of his 50th birthday, three volumes of Mickey's adventures, originally published in the 1930s, are now available in this beautiful little gift book. Full color reproduction of the originals. 128 pp. $7.95

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Associate Membership Benefit

Breakfast at the Smithsonian.

You just can't appreciate the wonders of the Smithsonian on only toast and coffee . . . So get your visit off to a good start with a lavish, all-you-can eat breakfast buffet at the Associates Court.

Members may select from a taste-tempting array of traditional breakfast dishes to delightful cheese-filled crepes with strawberry topping . . . All for only $2.95 ($1.95 for children).

Breakfast service will resume seven days a week beginning March 18 and continue through Labor Day from 8:30 to 11:00 a.m. in the Museum of Natural History, 10th Street at Constitution Avenue. No reservations required. *Admittance by Associate's Card at the Constitution Avenue entrance only.*

Commercial parking is available at the National Air and Space Museum, 7th St. and Independence Ave. And to assist in planning your visit, orientation services are provided in the Castle from 10:00 a.m. to 4:00 p.m.

We'll look forward to seeing you. Please keep this announcement for reference.

The Associates Court

Blalack and Paul Roth, *American Cinematographer,* July 1977

London shows (p. 68)

The Great Belzoni by Stanley Mayes, Walker & Company, 1961

Domestic Manners of the Americans by Frances Trollope, edited by Donald Smalley, Alfred A. Knopf, 1949

Curiosities of London by John Timbs, Longmans (London), 1867, reprinted by The Gale Research Co. (Detroit), 1968

The New Golden Land by Hugh Honour, Pantheon Books, 1976

Giant water lily (p. 78)

"Giant Water-Lily of the Amazon" by Roger Perry, *Wildlife* (London), October 10, 1976

"The Beetle and the Waterlily" by Ghillean T. Prance and Anne E. Prance, *Garden Journal,* August 1976

Amazonia by Jarbas G. Passarinho, Primor Publishing (Rio de Janeiro), 1969

"A Study of the Floral Biology of *Victoria amazonica*" by Ghillean T. Prance and Jorge R. Arias, *Acta Amazonica* (Manaus, Brazil), August 1975

Pompeii (p. 84)

Pompeii and Herculaneum: The Living Cities of the Dead by Theodor Kraus, Harry N. Abrams, 1976

Catalog of the exhibit in two volumes: *Pompeii and the Exhibit* and *The Objects Described* by John Ward-Perkins and Amanda Claridge, Museum of Fine Arts, 479 Huntington Avenue, Boston 02115, $4.50 each, $1.00 postage

Elephant seals (p. 94)

The Call of the Vanishing Wild by Lee M. Talbot, The Christian Science Publishing Society, 1967

"Elephant Seal: Return from Oblivion" by Jim Tallon, *Natural Parks and Conservation Magazine,* March 1973

Flat Earth experiment (p. 101)

My Life by Alfred Russel Wallace, Dodd, Mead, 1905

"The Convexity of Water" by William Carpenter, *The Field,* March 26, 1870

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Lady, Be Good!
The original 1924 production is reconstructed with performances by Fred and Adele Astaire (one contains *his* first dancing on records) and by George Gershwin himself. The selections have been taken from several sources, including some Gershwin radio broadcasts. Including: *Oh, Lady Be Good!* • *Fascinating Rhythm* • *Half of It Dearie Blues* • *Hang on to Me*
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Smithsonian highlights

April Celebrations

Long museum hours, a burst of new exhibitions, the opening of outdoor cafés and festive musical presentations welcome spring at the Smithsonian.

Chinese, Japanese and Korean Ceramics
On April 10 the Freer Gallery opens a major show of ceramic works from the Orient, which includes plates, jars, bowls and vases from the Neolithic Age through the 18th century.

Els Quatre Gats: Art in Barcelona Around 1900
The Hirshhorn Museum and Sculpture Garden begins an exhibition of 50 drawings, prints, paintings and posters on April 13. Fourteen Spanish artists, among them Pablo Picasso, are represented here through June 25 (below).

Phil Ratner's Washington
Nationally acclaimed sculptor Phil Ratner, an art teacher at Anacostia High School for 19 years, will be featured in a one-man show at Anacostia Neighborhood Museum from April 16 through August 27.

Salute to Spring
The Museum of History and Technology has organized a program of weekly Sunday afternoon (3-4 P.M.) concerts. On April 2 and 16 a group of costumed Renaissance singers, the Nymphs and Satyrs, will perform near the pendulum. On April 9, 23 and 30 the Circle Singers will present light opera selections there.

Continuing Events

Museum of Natural History
"Perfectly Beautiful: Art in Science," with 60 illustrations, continues through the summer.

Division of Performing Arts
- The Theater Chamber Players present an evening of music for string quartet and flute on April 3 at 8:30 P.M. in Baird Auditorium, Museum of Natural History.
- Dewey Redman, jazz saxophonist, performs at 6 P.M. on April 9 in the Hirshhorn Auditorium.
- "Music for Fortepiano" will be presented on April 10 at 8:30 P.M. in the Hall of Musical Instruments, Museum of History and Technology.

Ink and pencil drawing from Picasso's Barcelona years

Smithsonian Institution Traveling Exhibition Service

For information on SITES, write: Eileen Harakal, Smithsonian Institution, Washington, D.C. 20560, or call (202) 381-6631.

- Mt. Vernon, Iowa—"Folk Baroque in Mexico: Mestizo Architecture through the Centuries" will appear at the Cornell College Commons April 15-May 14.
- Harrodsburg, Kentucky — "Shaker Built" will be on exhibit at Shakertown, Pleasant Hill, April 15-May 14.
- Needham, Massachusetts—"America's First Ladies" will appear at the Needham Public Library April 8-May 7.
- Irving, Texas—"Early Chicago Architecture" will be shown at the University of Dallas April 8-May 7.

Regional Programs

Indianapolis

The regional activities of the Smithsonian National Associates Program in Indianapolis, April 15-24, are cosponsored by the Children's Museum, the Indiana Historical Society, the Indiana State Museum and the Indianapolis Museum of Art. Events scheduled include:

- The Smithsonian Chamber Players will perform baroque and classical music on antique instruments and conduct workshops on instrument making. A young people's concert is scheduled.
- Richard Fiske, curator, National Museum of Natural History, will lecture on plate tectonics, the revolutionary theory of Earth sciences.
- Charles Millard, chief curator, Hirshhorn, will survey contemporary art as reflected in the collections of the Hirshhorn and the Indianapolis Museum of Art.
- Herman Viola, director, National Anthropological Archives, will lecture on 19th-century Indian delegations to Washington, D.C.
- Historian Marc Pachter, art historian Richard Murray, education specialist Ann Bay and photographer-filmmaker Kjell B. Sandved will also lecture.

Dayton

Regional activities in Dayton, April 21-29, are cosponsored by the U.S. Air Force Museum, Aullwood Audubon Center, Dayton Art Institute and Dayton Museum of Natural History. Events scheduled for Dayton include:

- The Victoria-Transvaal Diamond, the world's largest known champagne-colored diamond, will be on display at the Dayton Museum of Natural History.
- Sculptor Joan Danziger, conservator Eleanor McMillan, historian Marc Pachter, aviation historian Paul Garber, the Smithsonian Chamber Players and Frank Greenwell, who will explore the world of "Night Creatures," will make guest appearances.

Phoenix

Regional activities, April 30-May 8, are cosponsored in Phoenix by the Heard Museum, Phoenix Art Museum and Scottsdale Center for the Arts. Events scheduled for the week include:

- Representatives from the Family Folklore Program will present an exhibition, lecture, films and informal workshops on collecting family folklore.
- Edward P. Lawson, of the Hirshhorn, discusses the impact of French Impressionists on American art.

Smithsonian Institution Offers Commemorative Aviation Relic

WRIGHT EX "VIN FIZ"

Pilot: Cullbreath Perry Rodgers

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The "Vin Fiz" made the first U.S. transcontinental flight in 1911 taking off from Shepshead Bay, Long Island, New York on September 17 and landing in Pasadena, California on November 5. Cullbreath Perry Rodgers covered the 6353 kilometers (4331 miles) in 82 hours and 9 minutes flying time at an average speed of 84 kilometers per hour (52 miles per hour) with seventy landings en route. The "Vin Fiz" is part of the Collections of the National Air and Space Museum.

The Wright Ex "Vin Fiz", the aircraft that made the first U.S. transcontinental flight in 1911, has been completely restored and is exhibited in the National Air and Space Museum. The historic original fabric, which was replaced during the restoration, is now available to the public. The best portions of the fabric have been cut into squares and mounted on handsome 15" x 20" posters.

The "Vin Fiz" poster, the fifth of the Aviation Relic Series, will make a unique gift. Worthy of framing, this piece of history is a collector's item.

Information regarding the first, third and fourth posters in this series, the Douglas World Cruiser, the Curtiss NC-4 and the Fokker T-2, may be obtained by writing to the address below. The second poster is no longer available.

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Pruning as a means to more nearly perfect wines.

To us, pruning—the cutting off of living parts of the grapevine—is the single most important practice in the entire culture of grapes.

It is a complex and highly judgmental operation that not only controls the amount of crop our vines will bear, but also controls the quality of the ultimate contribution that crop will make to our wines.

That is why, in the Gallo vineyards, we do not consider a man thoroughly experienced until he has been pruning for at least 3 years.

Why We Prune

The whole purpose of pruning is to direct our vines to grow fewer but better grapes—grapes of optimum maturity and with the full potential of their variety.

Such grapes will have acid and sugar contents in perfect balance, and their wine will be full-bodied, deep and brilliant in color, and with a bouquet that is true to the grape.

If we allow a vine to produce too many grapes—a condition called overcropping—we risk producing a thin, watery wine.

Our Unique Next Step

Sometimes, despite judicious pruning, a vine will overproduce anyway—perhaps because of exceptional vigor, or a particularly fertile soil.

In such a case, we resort to thinning.

Thinning involves the actual removal of whole grape clusters from the vine—the sacrificing of a part of our crop in order to ensure the quality of the remainder.

Sometimes this can mean removing as much as one-half the crop from an overproducing vine. Or all of it, if we wish to give the vine a rest to regain its vigor.

Gallo, we might point out, is one of the very few wineries to practice this costly technique of thinning in order to produce only the best possible wine.

How We Prune

Pruning is basically an art. And over the years we have developed techniques that we believe provide the best possible results of that art.

We began researching and establishing our pruning practices back in the 1940's.

At that time, every single variety of grape was given its own program to determine the best method of pruning for that particular vine.

As a result of our tests, we have established some general rules.

One, is that on each spur—that part of the new wood which remains after pruning—we never leave more than two buds for future growth. This ensures optimum grape quality.

We do, however, vary the number of spurs on each vine. This depends on the variety.

For example, the Chenin Blanc and Ruby Cabernet vines are allowed up to 12 spurs, our French Colombard 14, and our Barbera 10.

In general, the vines bearing larger grapes and grape clusters are left with fewer spurs so as not to tax them beyond their capacities, and the vines bearing smaller grapes and grape clusters are left with more.

Who Prunes

Because so much depends on the judgment of our pruners—in addition to how much to cut, at what angle, and which wood—we treat their training very seriously.

At first, a beginner is only allowed to watch. Then he is permitted to work only when an experienced man is watching him. And finally, before working independently, he must work under a foreman.

That is why, as mentioned earlier, it is usually 3 years before we consider him a thoroughly experienced pruner.

Our Goal

Obviously, the reason we are so particular about pruning is the direct relationship it has on the quality of our wines.

Our personal philosophy is that excellent wines can only be made from excellent grapes, and that perfect wines require perfect grapes.

Therefore, because our only goal is to make the finest wines possible—to give you pleasure by bringing you only the fullest perfection of flavor, taste and bouquet—we are totally committed to growing and using only the best quality grapes.

That insistence on perfection, really, is the basic principle to which we have dedicated our wine-making lives.

E&J Gallo Winery, Modesto, California

- David Challinor, assistant secretary for science, describes the broad range of current research at the Smithsonian.
- The Smithsonian Chamber Players and Kjell B. Sandved will also be on hand (see description of regional activities at Indianapolis).

Extended Summer Hours

Beginning April 1 most Smithsonian museums will keep their doors open later in the evening. The 10 A.M. until 9 P.M. schedule applies to the Smithsonian Institution Building, Arts and Industries, the Hirshhorn, National Air and Space Museum, Museum of History and Technology and National Museum of Natural History. The Freer, Renwick, National Portrait Gallery and National Collection of Fine Arts will be open from 10 A.M. to 5:30 P.M. The National Zoo buildings will be open from 9 A.M. to 6:30 P.M.; the grounds 6 A.M. to 8 P.M. Anacostia Neighborhood Museum will be open weekdays from 10 A.M. to 6 P.M.; weekends 1 P.M. to 6 P.M.

When visiting the Smithsonian

Members are invited to register with the Associates receptionist in the original Smithsonian Institution Building—the old red castle on the Mall. Here, between 10 A.M. and 4 P.M. daily, members may receive special orientation materials to ensure a more enjoyable visit, and may relax in the Associates Lounge. Misplaced membership cards will be duplicated upon presentation of a SMITHSONIAN magazine address label. To aid in trip planning, members are encouraged to send a postcard or phone for an information packet: Associates Reception Center, Smithsonian Institution, Washington, D.C. 20560; (202) 381-6264. Members are advised that parking on the Mall is extremely limited.

The Court

Served every day of the week in The Court, a buffet-style restaurant for Associates only in the Museum of Natural History: Brunch 8:30-11 A.M. (entrance via Constitution Avenue), priced at $2.95 for adults and $1.95 for children; luncheon, 11 A.M.-3 P.M., priced at $3.95 for adults, $2.95 for children; dinner, 4:30-7 P.M., prices the same as for luncheon. Associate membership cards are required.

Exploring the World with the Smithsonian

For both the seasoned and would-be traveler, the Smithsonian has developed a travel program to meet a variety of tastes and budgets. In order to accommodate the increasing growth and interests of Smithsonian Associates, the tour programs have expanded, bringing travelers to places reflecting the Institution's interests.

Three types of trips are available, Charter, Domestic and Study, each with its distinct character. Foreign Study Tours provide small groups with culturally oriented, specialized trips, under the guidance of museum curators or experts in respective fields. Foreign Charter Tours, consisting of several small groups under the leadership of skilled guides and interpreters, are lower in cost, combine study, discovery and vacation. Domestic Tours offer specialized guidance and expertise generally unavailable to persons traveling on their own.

Foreign Charter Tours

Italy*—May 1-15: Explore the ruined grandeur of ancient Rome, the city's Renaissance churches and her baroque palaces and fountains. An eight-day program in Rome with museum seminars, walking tours and visits to ancient palaces and churches is followed by five-day excursions either to Florence, Orvieto and Viterbo; to Venice, Ravenna and Padua or to Naples, Pompeii and Capri.

Paris and Provence *—May 15-29 or September 4-18: Paris plus Avignon, Arles, Nîmes and Aix-en-Provence: museum seminars at the Louvre and the new Pompidou center; walking tours of the islands of the Seine; excursions to the Loire region, Chartres or Reims.

Scotland*—September 25-October 9: Edinburgh and beyond—a program of walking tours and special visits in Edinburgh: castles, abbeys, battlefields, archaeological sites, plus incomparable scenic beauties of rugged mountain glens and rollings hillsides through the Highlands and Lowlands of Scotland.

Guatemala—November 1-11: With an archaeologist, visit Tikal, the monumental Mayan city of the Petén jungle; Copán, a Mayan site deep in Honduras; plus the ruins of Quiriguá, El Baúl and La Democracia. (Originates in Guatemala City.)

Japan—November 5-21: The heart of historic Japan with extended program in Kyoto and Nara followed by choice of travel seminars to the Inland Sea, the Sea of Japan or Kyushu. Conclude in Tokyo with visits to Nikko or Kamakura. Visit ancient temples, castles and shrines with expert study leaders. (Originates and ends in San Francisco.)

New Zealand and Fiji—November 17-December 5: Departing Los Angeles, this tour includes Mt. Cook, Te Anau and Milford Sound, plus Auckland, Rotorua, Wellington and Christchurch. Included will be talks on New Zealand's natural history, Maori heritage, parliament, plus a home visit. Brief rest stop at Fiji before return flight to the West Coast.

Yucatán—December 2-14: A complete tour of the extraordinary Mayan ruins of the Yucatán. (Originates in Mérida.)

Low cost of tours includes first-class hotels, most meals, sightseeing, lectures, theater tickets and air fare. *Optional predeparture course will be available. Write Smithsonian Associates Travel Program, A&I 1278, Smithsonian Institution, Washington, D.C. 20560 or call (202) 381-5635 for details.

Domestic Study Tours

Chicago—May 10-14: Discover the architectural treasures of this vibrant city with walking tours and lectures by the Chicago Architecture Foundation; visit the Art Institute of Chicago and the theater.

Shenandoah Mountains—June 3-10: Study the geology, archaeology, natural and social history of these beautiful Virginia mountains. Tour originates in Washington with an orientation talk at the Smithsonian.

Arts and Crafts of the Southwest—June 23-July 2: Discover the influences of the Indian, Anglo and Spanish cultures on traditional and modern arts and crafts of New Mexico, through lectures, craft demonstrations, museum and gallery visits.

High Sierra Camping—July 15-24: Explore California's Sierra Nevada by four-wheel drive vehicle; learn how the bristlecone pine has survived as the oldest living thing. Spectacular scenery for hikers.

Desolation and Gray Canyons—July 23-August 2, September 29-October 9 or October 10-20: White-water trip for the adventurous; explore the geology, wildlife and Indian and outlaw history of Utah's Green River.

Wind River Mountains—July 29-August 6: A horseback trip into the land of mountain men. Camp at 10,000 feet among turquoise lakes and high-meadow wild flowers.

Williamsburg Family Weekend—August 10-13: A repeat of our popular program for children ages 6 through 14 (and their parents) to learn about 18th-century life through participation in special tours.

Winterthur and the Brandywine Valley—August 12-20: Focusing on architecture, furnishings and decorative arts, visit the world-renowned collections at Delaware's Winterthur Museum. Explore the restored 18th-century towns of the Brandywine Valley and Maryland's Eastern Shore.

Grand Canyon—August 18-28 or August 25-September 4: An exciting raft trip through the Grand Canyon with emphasis on ecology and history.

Canadian Rockies—September 7-17: Discover Alberta's scenic beauty and natural wonders on daily hikes at Lake Louise and Banff Springs. Meet in Vancouver with an overnight train trip to Lake Louise.

Mesa Verde—September 24-October 2: Enjoy autumn colors in the Southwest while learning about the history of the Pueblo Indians through in-depth visits to important archaeological sites as well as Canyon de Chelly, Arizona.

Washington "Anytime" Weekend: Choose any weekend to visit the nation's capital and enjoy a special tour of the original Smithsonian building, spend two nights at Loew's L'Enfant Plaza Hotel close to the Mall, and see other sights in Washington by Tourmobile. Reservations and payments must be received at least ten days prior to arrival date ($59.95, double occupancy).

Brochures on specific tours are available. For information, write Smithsonian Associates Travel Program, A&I 1278, Smithsonian Institution, Washington, D.C. 20560 or call (202) 381-5635.

Foreign Study Tours

Gods and Gardens in the Western Mediterranean—April 29-May 15: Cruise on MTS *Argonaut* from Rome to Lisbon, visiting Roman and medieval centers of civilization in northern Italy and France, Barcelona's museums and architecture, Moorish Spain and Tangier. The guest lecturer will be A. Hyatt Mayor, Curator Emeritus, Print Department, Metropolitan Museum of Art.

Thomas Jefferson in England and France—July 9-30: His travels are retraced, with emphasis on country houses and gardens he admired; led by Professor Frederick Nichols of Charlottesville.

Iraq and Iran—October 30-November 25: Fly from New York to London, visit Mesopotamian collection in the British Museum, then to Iraq for Baghdad, Babylon, Ur, Nineveh and historic sites. In Iran, visit Tehran, Shiraz, Persepolis and Isfahan. Return via London to New York.

For detailed information, write: Miss Bliss Schumann, Foreign Study Tours, S.I. 123, Smithsonian Institution, Washington, D.C. 20560 or call (202) 381-5520.

By Michael Olmert

1066, OK, but let us not knock good old 1885

Dates. Think of the really great ones: 1066, 1492, 1776 . . . and then there was 1923, the year Colonel Schick patented his electric razor.

Those first three were truly the best of times. They are also a part of the indelible baggage that all of us carry through life—thanks largely to those persistent Red Caps of our developing minds, our high school teachers. Because of them, we all know that 1789 means the French Revolution, the year when the feudal, absolutist and conformist traditions of the old order came into collision course with gunpowder and guillotines.

But if it hadn't been for the Bastille or our own Constitution going into effect, and all that, the year could have been known for the mutiny on the *Bounty*. Or the founding of New York's Tammany Hall. Or, more likely, the death of Eclipse, the world's "greatest"—and unbeaten—racehorse. Of course, it does take a rather special kind of teacher to test the staying power of political corruption, the track, or Charles Laughton at Pitcairn. Still, a fellow could try.

The big surprise is that there are so many more years—nearly 2,000 since the birth of Christ alone. Why do we have to keep falling back on the clichés, such as 1485, 1588, 1914?

For example, Kenneth Clark chose 1755 as the onset of the Age of Romanticism. I like that date. Lord Clark is struck by the pain and suffering caused by the Lisbon earthquake of that year. It startled mankind and forced it to recognize the brittle impossibility of a classically ordered and manicured world in the face of such threats. It was so traumatic that Madame de Pompadour refused makeup for an entire week.

As I said, I like Lord Clark's date. But I would rather plump for the next year, 1756, when Germany built the first chocolate factory. That year taught us what a really great piece of candy could taste like. No wonder the world had been so stern and proper. Until that watershed year, presumably, we had to make do with marzipan and treacle. Nor was Man content to rest on his laurels: someday, he mused, we will invent (and later endlessly shrink) the Hershey bar.

You've probably noticed that writers are always coming up with blinding flashes of insight like this. And where do they come from? From books. From a kind of wholesale date catalog, or chronology, like Bernard Grun's *The Timetables of History*, Neville Williams' *Chronology of the Modern World*, R. L. Storey's *Chronology of the Medieval World* or, another rattling good read, *The Annals of English Literature*. These books all have one thing in common: they are unadorned lists. But they have saved the skin of many a blocked writer.

Suppose, for the moment, you have been assigned a history of science essay on, say, Ohm's Law. But you can't think of a properly gripping lead. Well, after turning to the timetables, you could write: "In 1827, the Romantic spirit was clearly past its prime. Those twin celebrants of a questing but tortured human soul, Beethoven and William Blake, died. The world was about to change. Almost at one stroke, Karl Baedeker, publishing the first of his travel guides, trivialized the grand tour that Keats, Shelley, Mendelssohn and the rest found so stimulating. Meanwhile, in Germany an unknown physicist, Georg Simon Ohm, was making electronics as easy as P = IE."

Every teacher of English literature worth his spurs drills his students on the two luminaries who died in the first year of a century: Chaucer (1400) and John Dryden (1700). But there were two others as well: the poet of simple rural delights, William Cowper—"The Stricken Deer" as a biographer called him—died in 1800. And Oscar Wilde went to his reward just a century later.

One can even play a kind of tag through history. For example, in 1770 the world lost Giuseppe Tartini, the violin virtuoso, but Beethoven was born. In 1827, yes, Beethoven died, but Joseph Lister was born. In 1912, leaving his name to a mouthwash, Lister died, and the *Titanic* sank. It's easy. With books like these, if life were a snap quiz, you and I could be on our way to the White House. The trouble is, most times, life is tougher—an essay question.

Years ago, in *The Mikado,* W. S. Gilbert complained about "all children who are up in dates and floor you with 'em flat." And he was right. By the way, *The Mikado* was first produced in 1885. That year also saw the forces of the Mahdi and his Fuzzy-Wuzzies overrun Khartoum and kill General "Chinese" Gordon; the second volume of *Das Kapital* was published, along with Walter Pater's *Marius the Epicurean* and H. Rider Haggard's *King Solomon's Mines*; Van Gogh exhibited *The Potato Eaters*; the individuality of fingerprints was proved and, maybe, your grandfather was born; so don't knock old 1885, a real big and busy year.

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